P6160.14

PROGRAM IMPLEMENTATION PLAN
for
DISPLAY CHANNEL COMPLEX REHOST
CIP # A-01 (21-12H)
Acquisition Phase 4 (Prior to DRR)

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

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FOREWORD

This Program Implementation Plan (PIP) for the Display Channel Complex Rehost (DCCR) program provides technical information and guidance to all levels of the Federal Aviation Administration (FAA) that are involved in the DCCR program from its inception through removal of the replaced equipment. The PIP is focused on the eleven essential elements of information prescribed in FAA Order 1810.1F for PIP content, and it complies with the FAA-STD-036 format.

Included as Appendix A in this document is a DCCR Generic Site Implementation Plan (GSIP) to provide a tool to assist regional and site personnel to develop site specific implementation plans. At Appendix B is a Transition Information Exchange (TIE) Summary that identifies and provides resolution status of issues affecting DCCR implementation activities. Appendix C provides a list of acronyms used in the PIP.

This PIP is a living document that derives its value through the coordination, analysis, and modification of the information contained within. It will be updated at each phase of acquisition after every program Key Decision Point. The recipients of the DCCR PIP are encouraged to submit information and recommended changes to the document at any time during the acquisition prior to deployment.

APPROVAL

Perry Copp
Product Lead for
Display Channel Complex Rehost, ACT-205

Wilmer Hunter
Manager, Implementation
Management Division, ANS-200

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This notice informs recipients that the standard identified by the number (and revision letter) shown in block 4 has been changed. The pages changed by this DCN (being those furnished herewith) carry the same date as the DCN. The page numbers and dates listed below in the summary of changed pages, combined with non-listed pages of the original issue of the revision shown in block 4, constitute the current version of this specification.

13. DCN No.	14. Pages changed	S*	A/D*	15. Date

S* = Indicates Supersedes Earlier Pages *A = Indicates Added Page *D = Indicates

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1.0 GENERAL

1.1 Purpose of Document

The Display Channel Complex Rehost (DCCR) Program Implementation Plan (PIP) provides guidance and direction for the orderly implementation of the DCCR at five United States Air Route Traffic Control Centers (ARTCC). These sites and their implementation schedules are identified in section 11.3. This PIP is organized by the 11 essential elements of information as defined in Federal Aviation Administration (FAA) Order 1810.1F and identifies the activities, schedules, technical direction, funding, required plans, and participants involved in the implementation of the DCCR program. It also contains three appendices, including the Generic Site Implementation Plan (GSIP) and the Transition Information Exchange (TIE) Summary Report. The GSIP is a generic site configuration task list which defines activities to be accomplished during the seven phases of implementation described in Chapter 13. It was constructed with the assistance of personnel from the lead region (Great Lakes) and the first DCCR site (Chicago ARTCC), and is intended to aid individual sites in building specific Site Implementation Plans (SIP). The TIE Summary Report is a synopsis of transition and implementation issues, and summarizes the action plans and resolution of each issue.

1.2 Scope of Document

This PIP is applicable to all levels of the FAA with responsibility for implementing the DCCR program. The scope of this PIP is limited to those activities necessary for the implementation of the DCCR program at ARTCCs. Although only the five ARTCCs with Display Channel Complex (DCC) equipment are currently scheduled to have DCCR installed, this document is written to include the possibility of fielding DCCR at ARTCCs having Computer Display Channel (CDC) equipment.

The DCCR system to be installed at the FAA Technical Center (FAATC) is NOT included in this plan. However, the information provided by this document is as appropriate for guidance in the development of support facility site specific implementation plans as to ARTCC site specific plans.

1.3 Distribution

This plan should be distributed to the team level of the Air Traffic Service, Airway Facilities Service, Office of Independent Operational Test & Evaluation, Office of Acquisitions, Office of Air Traffic Systems Development, Office of Communications, Navigation & Surveillance Systems, Office of System Architecture & Program Evaluation, and Office of Human Resource Management. This plan should be distributed to the branch levels of the FAA Technical Center; the regional Air Traffic, Airway Facilities, and Logistics Divisions; and the Mike Monroney Aeronautical Center's Office of Facility Management and FAA Logistics Center. Also this plan should be distributed to Air Traffic and Airway Facilities field sites.

1.4 Updates

The current installation schedule for the five operational DCCR systems will be completed in a period of five months, beginning in June 1996. Given this compressed schedule, no update to this PIP immediately following the first installation is anticipated. Implementation lessons learned and any changes that may take place with the system will be addressed as required.

1.5 Definition of Terms

The following terms are used throughout this document and are defined here to assist the reader.

Implementation: Those activities necessary to deploy and support the products of a single program into a facility or field environment. Implementation activities include site and facility preparation for new or relocated systems and equipment, equipment installation and test, and completion of all steps leading to full operational capability, including Initial Operational Capability (IOC), Operational Readiness Demonstration (ORD), and final acceptance and certification by Air Traffic and System Operations personnel (refer to Section 13.2 for specific information regarding DCCR implementation).

Transition: Transition is used in this document to indicate the activities surrounding the shifting of operations from one system to another. This use of transition is nonstandard from its normal usage in other PIPs and is due to the reference in this document to the Contractor's Transition Plan when explaining the procedures necessary for shifting operations to the DCCR system.

The following phases comprise the implementation process:

Planning: Implementation Planning begins during the Concept Exploration Phase of the acquisition process. The planning phase ensures that adequate resources will be available and that appropriate preparation has been completed prior to conducting site activities. (See section 13.2.1.)

Pre-Installation and Checkout (Pre-INCO): This phase begins with the program site survey and concludes with delivery of program equipment at the site. Pre-INCO activities include power installation, signal cable location, site preparation and facility construction, and culminates with the delivery of program equipment and successful completion of site preparation. (See section 13.2.2.)

Installation and Checkout (INCO): INCO activities address the installation and completion of stand-alone testing of prime mission equipment. Successful completion of Contractor Acceptance Inspection (CAI) normally denotes the end of INCO. (See section 13.2.3.)

System Integration: Integration begins upon successful completion of INCO. The program equipment is integrated with existing National Airspace System (NAS) systems/subsystems, including FAA internal and external interfaces. Interface testing is conducted, and IOC may be declared. (See section 13.2.4.)

Field Shakedown: Once IOC is declared, controllers, maintenance staff, system engineers and managers take steps to increase the number of staff at full proficiency on the system during

System Shakedown. The Contractor provides support, including on-the-job training (OJT) and briefings to all personnel involved in the program. System use begins in a carefully controlled operational environment during limited, low traffic periods and increases incrementally to verify that the integrated system is fully functional. The end of System Shakedown normally is marked by the final Joint Acceptance Inspection (JAI) and an ORD. (See 13.2.5.)

Dual Operations: Dual Operations at replacement sites follows ORD and commissioning of the new system through decommissioning of the old system. This time is used to develop increased confidence in system operations and supportability under live traffic conditions. Dual Operations Phase will not take place with the DCCR program. (See 13.2.6.)

Equipment Removal: Equipment Removal occurs after the facility managers decommission the old system, which at this point is no longer required for operational backup. During Equipment Removal, old equipment is removed and disposed of, the old facility is closed or removed and FAA facility and equipment databases are updated to reflect the new configuration. (See section 13.2.7.)

Other terms used throughout this PIP include:

Personnel Certification: Personnel certification is a two-phase process consisting of a certification authority phase and a responsibility assignment phase. Certification authority requires FAA technical personnel to demonstrate knowledge of the theory of operations and the ability to practically demonstrate this knowledge. Certification responsibility is the official assignment to FAA technical personnel to use their authority to certify a specific service/system/subsystem/equipment in the NAS.

System Certification: Periodic verification and validation that the advertised quality and scope of services, and the capability of providing those services, are being provided to the users.

Transition Information Exchange (TIE): The Transition Information Exchange (TIE) process is conducted by the Associate Program Manager for NAS Implementation (APMNI) to identify and resolve program implementation and transition issues. A TIE is conducted during each acquisition program phase and is a criterion for exit to the next phase. The TIE begins with dissemination of the PIP to appropriate regional, sector/hub, and facility personnel for review and assessment. Issues identified as a result of the field review are raised and resolved through normal channels at the lowest level of management attention possible.

Transitory State: The period of time at a site from Pre-INCO through Equipment Removal.

1.6 Associated Documents

Following are source documents used in the preparation of this PIP:

1. DCCR Mission Needs Statement (MNS), MNS-069, Revision No. 1, FAA, August 11, 1995;
2. DCCR Operational Requirements Document (ORDoc), FAA, December 20, 1995;
3. DCCR Specification (SPEC), FAA-ER-DCCR-100-1, Revision A, Federal Aviation Administration, March 30, 1995;
4. DCCR Statement of Work (SOW), DTFA01-95-C-00042, Attachment J-1, December 18, 1995;

5. Implementation Process Guidelines (IPG), FAA, June 1994;
6. Preparation of Program Implementation Plans, FAA-STD-036B, May 10, 1994;
7. Draft DCCR Integrated Logistics Support Plan (ILSP), FAA, February 21, 1996;
8. Letter Contract DTFA01-95-C-00042, Display Channel Complex Rehost (DCCR), FAA, August 28, 1995;
9. Hardware Data Spreadsheets (Preliminary), Loral, January 22, 1996;
10. DCCR Program Transition Plan (TP), FAA-DCCR-95-100, CDRL Item: P090, December 15, 1995;
11. Draft DCCR Transition Concepts and Requirements, FAA-TRO-XXX-00X, September 29, 1995;
12. Display Channel Complex Rehost (DCCR) PDR/CDR Meeting Material, FAA-DCCR-95-029, CDRL Item: D011-3, April 25, 1995;
13. DCCR Risk Management Plan, Volume I and Volume II, FAA, September 29, 1995;
14. FAA Program Manager's Guide, FAA, April 1994;
15. Human Resources Transition Planning Workbook, FAA (ANS-120), undated;
16. DCCR Production and Deployment Technical Proposal, Final Draft, FAA-DCCR-P-/D-001, October 31, 1995

1.7 Cancellation

This is the first publication of a PIP for the DCCR program.

1.8 Authority to Change

The DCCR Product Lead (ACT-205) and the Manager, Implementation Management Division (ANS-200) are the approval authorities for all changes to this document. Requests for changes to this PIP should be directed to the Product Lead for DCCR, ACT-205, FAA Technical Center, Atlantic City International Airport, New Jersey 08405. Authorized changes, updates, and revisions to this document will be made by the cognizant Associate Program Manager for NAS Implementation (APMNI). (Source: Draft FAA-STD-036C, October 17, 1994, page 3.)

1.9-1.19 (Reserved)

1.20 Risk Assessment Overview

Program risk information is provided at the end of each chapter.

2.0 PROGRAM OVERVIEW

2.1 Synopsis of Mission Need

2.1.1 Operational Needs

The display system capabilities in place at ARTCCs must be maintained. The current display channel used within the ARTCCs is antiquated, experiencing degradation in overall supportability and is in need of replacement. The DCCR replaces the aging and/or obsolete Display Channel Complex, and potentially the Computer Display Channel, equipment currently supporting the display and data entry automation needs of en route air traffic controllers and support personnel. The DCCR will support all of the operational functions which exist in the current ARTCC environment. Although currently scheduled for installation only in the five ARTCCs equipped with DCC systems, the DCCR could be used in all 20 ARTCCs for the control of en route air traffic in the same manner as the existing system. (Source: DCCR MNS, MNS-069, Rev. No. 1, August 11, 1995, page 4.)

2.1.2 Strategic Goals

The DCCR is an interim system to be installed at five ARTCCs for use until the deployment of the Display System Replacement (DSR). Table 11-1 lists the five ARTCCs and delivery schedules where the DCCR will be implemented. The DCCR system makes maximum use of Commercial-Off-The-Shelf (COTS) and Commercially Available Software (CAS) products where they are capable of fulfilling operational requirements in order to reduce costs, shorten the development and deployment time, capture state-of-the-art technology, and reduce program risk. The goal of the DCCR program is to improve the display channel equipment reliability, maintainability and availability, while providing additional display channel capacity. Deployment of DCCR equipment permits Air Traffic Control (ATC) to continue with the present functionality, but with the benefit of new hardware. DCCR implementation will be transparent to the controller.

Close coordination between Headquarters and Regional Air Traffic/Airways Facilities representatives will be maintained to identify implementation strategies which will ensure the least amount of disruption to current operations. Implementation planning will also focus on the earliest identification of space requirements and strategies for site preparation. Refer to Chapter 13 for more detail on the implementation strategy for the DCCR program. (Source: DCCR ORDoc, December 20, 1995, page 5; Draft DCCR ILSP, February 21, 1996, section 1.1.)

2.2 Functional Description

The DCCR is intended to perform its functions within the same system environment as the original DCC, which is basically digital in nature. Primary and secondary radar data is transmitted from the radar site in digital message formats to a Central Computer Complex HOST (CCCH) which is located in an air traffic control facility. The DCCR accepts the radar and other data from the CCCH and processes alphanumeric, symbolic, and map data for proper positioning on Plan View Display (PVD) control consoles to allow air traffic controllers to perform their functions for safe and efficient air traffic control. The keyboards, data entry devices, and control panels in the display console are used by the controller to enter messages into the CCCH and other interface equipment, as well as to select and control types of data to be displayed. Figure 2-1 is a functional diagram of the DCCR system. (Source: DCCR SPEC, March 30, 1995, section 1.1.)

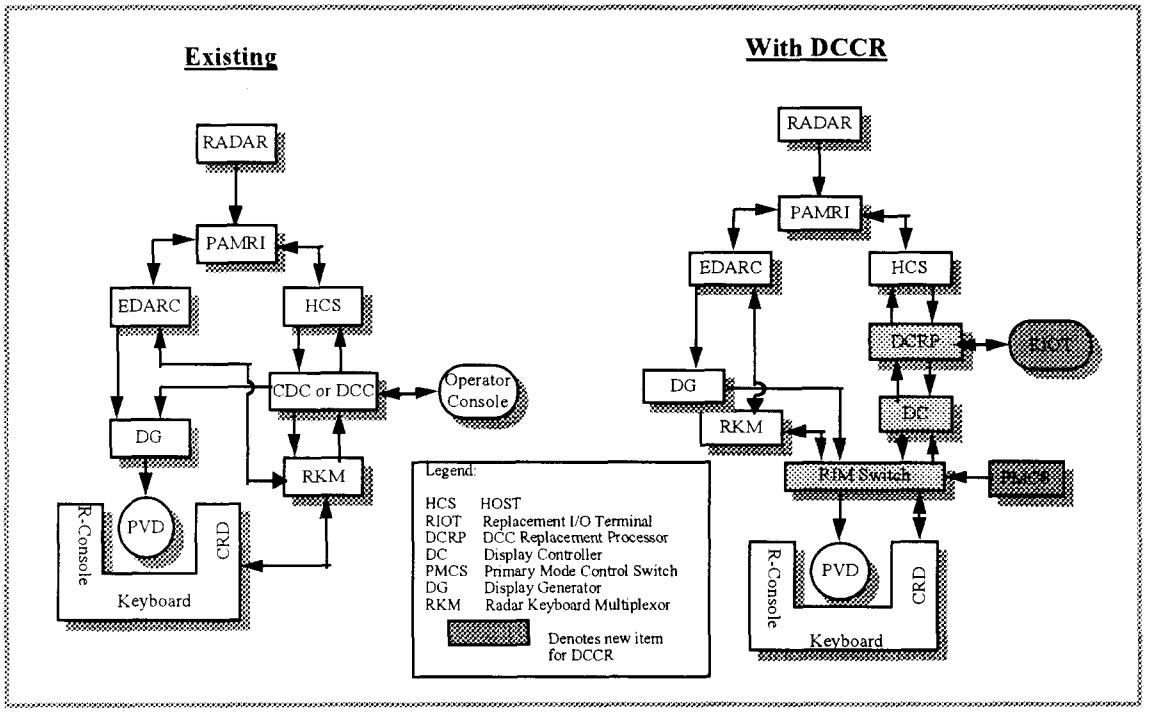

Figure 2-1 DCCR Functional Diagram

2.2.1 Display Channel Overview

The following paragraphs provide a brief overview of the DCCR, as provided in DCCR CDRL D011-3, and current display channel systems.

2.2.1.1 DCCR Overview

The system is divided into four subsystems described below:

DCCR Processing Subsystem. This subsystem consists of the Display Channel Replacement Processor (DCRP) and its associated peripherals. The DCRP is an IBM rack-mounted Enterprise System 9000 (ES/9221-170) processor which will execute the rehosted IBM 9020E DCC software and generate display images of NAS data to be displayed on the controller PVD displays.

Replacement Input/Output Terminal (RIOT) Subsystem. The Replacement Input/Output Terminal (RIOT) subsystem uses an IBM Personal Computer or compatible with a windowed presentation approach to satisfy the local user interface requirements of the DCCR for the Computer Operator, NAS Operations Manager (NOM), and special function positions.

Display Controller (DC) Subsystem. The Display Controller (DC) subsystem performs display hardware functions of the IBM 9020E and associated Display Generator (DG) and Radar Keyboard Multiplexer (RKM) equipment. Certain 9020E applications functions have also been allocated to the Display Controller and are performed in microcode. All keyboard, trackball, and display control functions of the current NAS Display Channel Processor (DCP), RKM and DG elements will be performed by the Display Controller.

DCCR Switching Subsystem. This subsystem consists of the **R**-Console Interface Module (RIM) switch and the Primary Mode Control Selector (PMCS). The PMCS will be removed once transition to DCCR is completed. The DCCR Switching Subsystem provides two functions:

1. During transition, the RIM switch provides the capability to select either the DCCR or the DCC/CDC as the prime channel, or Enhanced Direct Access Radar Channel (EDARC) as the back-up channel.
2. When DCCR becomes the exclusive prime display channel, the RIM switch will arbitrate control of interface to the **R**-Console between operational Display Controllers, redundant Display Controllers, DCRPs, and EDARC.

2.2.1.2 Existing System

The current DCC system consists of a centralized, special purpose IBM Systems/360 (Model 9020E) with an effective maximum processor speed of approximately 1.2 Million Instructions Per Second (MIPS). The total storage capacity of this hardware platform consists of 2.0 MB of General Purpose memory, 127 KB of storage in the Input/Output Control Element (IOCE), and 1 MB of display refresh memory. The rated maximum aggregate channel bandwidth available on this processor is 900 KB/second. The maximum number of radar controller positions supported by the DCC is 90.

The software which executes on this platform shares a common ancestry with the HOST Computer System (HCS) Monitor software of today. The applications, diagnostics, and support software also show commonality with the HCS equivalents but not to the same extent.

Architecturally different, but functionally similar is the CDC system. The processor at the center of this system is a Raytheon 730 general purpose computer. The effective processing rate is approximately 2.4 MIPS, with 2.0 MB of Program Storage, 1.0 MB of Buffer Memory and 1.0 MB Display Refresh Memory. The maximum aggregate Input/Output (I/O) bandwidth is limited by the specified data transfer rate to the HCS (3.0 MB per second). The maximum number of radar controller positions supported by the CDC is 60.

The software which executes on this platform is unique to the CDC but, as defined above, the functions it performs are similar to those performed by the DCC.

Both display channels and the EDARC, the system which provides backup radar service in the event of a prime channel interruption, interface to the display hardware via a common set of hardware. This hardware is sometimes collectively referred to as the "display back-end."

R-Controller messages are passed from the **R**-Controls through the RKM and are then forwarded to the HCS for processing. Responses to these messages and radar display images are formatted by the HOST and returned to the display channel where this data is then filtered, set to the appropriate geographic range scale, and output through the DG to the PVD.

While this represents a simplification of the architecture of each of these systems, it is not a complete picture. Because of software commonality with the HCS and because of its greater capacity, the DCC was chosen for the basis of development of a replacement display channel.

2.3 Program History & Status

Until display channel difficulties were experienced at various ARTCCs with increasing frequency in 1995, the DCCR program plan was to build a prototype system for testing at the FAA Technical Center. Production and deployment of DCCR was not planned unless the DSR program fell behind schedule. However, with the display channel problems mentioned above, a production decision for DCCR was made in July 1995. Program achievements to date include the approval of a Mission Needs Statement, development of a specification and statement of work, the drafting of supporting program documentation (e.g. ORDoc and ILSP), and the awarding of the DCCR contract. (Source: En Route Integrated Product Team [IPT].)

2.4 Program Milestones

Program milestones for DCCR, from the first Key Decision Point (KDP) to ORD, are provided in Table 2-1. (Source: DCCR Program Activities Schedule, Revision #29, February 9, 1996.)

Milestone	Date
Production Approval	7/26/95
MNS, Revision 1, Approval	8/10/95
Letter Contract Award	8/28/95
Deployment Readiness Review (DRR) EXCOM	11/30/96
Delivery to First Operational Site	6/7/96
First ORD	12/31/96
Last ORD	6/4/97

Table 2-1 DCCR Program Milestones

2.5 Inter-Agency Involvement

2.5.1 Department of Defense (DOD)

Not Applicable.

2.5.2 National Weather Service (NWS)

Not Applicable.

2.5.3 U.S. Customs Service

Not Applicable.

2.5.4 Drug Enforcement Agency (DEA)

Not Applicable.

2.5.5 Other Agencies

Not Applicable.

2.6-2.19 (Reserved)

2.20 Overview of Program Risks

The DCCR specification requires the integration of COTS hardware components which are widely available on the commercial market. Due to the ability to use commercially available, technically proven hardware components, the technical risk associated with the DCCR program is expected to be low. An aggressive deployment schedule has been developed that increases the amount of time available to each site between equipment delivery and ORD. No difficulty in meeting this accelerated delivery schedule is anticipated. Due to the urgency of this program, no funding difficulties are anticipated.

The certification requirements for the DCCR system and the accompanying impact on AF procedures need to be determined before ORD at the first site. There are no known Air Traffic (AT) risks associated with the implementation of this system. No system engineering or configuration or physical facilities issues/risks with the potential to impact DCCR implementation have been identified at this time. In the human resources area, specific implementation workload impacts of DCCR on the receiving sites need to be further defined. Also, the recent change in Maintenance Concept from Contractor Maintenance and Logistics Support (CMLS) over the life cycle of the DCCR to only the first five months following CAI has changed the training requirements for AF personnel. The requirements in this area are being addressed as course development is being formulated. No impact on the system support to be provided under this new concept is anticipated. In the area of testing, an aggressive deployment schedule will result in equipment being procured before testing begins. Only simulations at the FAA Technical Center will be performed prior to field installation. However, no testing difficulties are anticipated. The Test and Evaluation Master Plan (TEMP) was submitted to the Test Policy Review Committee (TPRC) for approval at the March 29, 1996 meeting. No program schedule issues have been identified, and no administrative risks beyond contract definitization are anticipated. Contract definitization is expected to be completed in April 1996. Implementation issues still requiring completion/ resolution include:

- Site preparation action items by DCCR sites, as identified during site surveys, must be completed before Contractor site fit-up;
- DCCR Disposal Plan, currently under development and scheduled for completion in May 1996 by ALM-500;
- Regional contract for the removal of replaced equipment;
- NAS Change Proposal (NCP) addressing power-on procedures for DCCR, submitted to ANS-220 by AUA-230;

3.0 AF OPERATIONS

3.1 Summary of Maintenance Operations Impacts

3.1.1 Transitory State

The focus of the transition effort to DCCR at the ARTCCs will be to minimize the changes to and impacts on ATC operations. The installation and integration of the DCCR equipment will impact system operations with different Initial Program Load (IPL) procedures, configuration display, certification procedures, and diagnostics that the operators must learn.

Site survey, fit-up, equipment installation, and testing will be performed by the Contractor, with limited involvement by AF personnel. (See paragraphs 3.3 and 3.4 and Appendix A.) The existing DCC equipment will continue to be maintained by AF personnel. Contractor personnel will maintain DCCR hardware and software equipment through the five months following CAI at each ARTCC. Following this five month period, trained FAA technicians will assume maintenance responsibilities for those systems. AF personnel will have limited involvement in the CAI, but will participate in the JAI effort required to capitalize the DCCR equipment. No flight check or flight inspection activities are required with the implementation of this system. Any AF participation in restoration efforts required with the removal of the DCC and associated equipment will be identified in the Disposal Plan, currently under development. (Source: DCCR TP, December 15, 1995, page 45; Draft DCCR ILSP, February 21, 1996, Chapter 3; DCCR SOW, December 18, 1995, section 3.10.)

3.1.2 Operational State

No significant impact on AF operations is anticipated with the implementation of the DCCR system. The DCCR has been developed to retain those features essential to the operation of the DCC while maintaining fundamental modes of interaction with the system already familiar to operations and Systems Engineer (SE) personnel. As indicated above and further discussed in Chapter 10 of this PIP, the DCCR Maintenance Concept provides for FAA technicians to maintain DCCR equipment beginning five months after CAI. (Source: DCCR CDRL Item: D011-3, April 25, 1995, page 336; ALM-500 DCCR Maintenance Concept, approved November 29, 1995.)

3.2 AF Procedural Changes

No significant AF procedural changes are anticipated with the implementation of the DCCR system. The DCCR has been designed such that off-line maintenance can be performed on individual units without affecting the on-line system. The bulk of maintenance will be performed off-line, although certain operational functions such as visual monitoring of equipment status, computer software monitoring of display equipment and maintenance of printouts will be performed with equipment on-line. (Source: DCCR SPEC, Revision A, March 30, 1995, section 3.8.)

3.2.1 Preventive Maintenance

A large number and variety of off-line, comprehensive maintenance programs will be provided by the Contractor for the first five months following CAI, and subsequently by FAA technicians.

These programs will contain routines to test all DCCR elements, including computer-oriented peripheral devices. A subset of these programs will accomplish the preventive maintenance function. Because of its size, the total package may be stored on tape with only a subset of the programs callable for use by the off-line maintenance function at any time. The frequency of preventive maintenance will be provided by the Contractor.

AF personnel at the ARTCC will notify the Contractor (Contractor support period) twenty-one days in advance of any required preventative maintenance actions. When the preventative maintenance is completed, the Contractor will notify the AF point of contact so verification activities can be performed as appropriate. (Source: DCCR SPEC, March 30, 1995, sections 3.6 and 3.8; Draft ILSP, February 21, 1996, section 3.5.1.)

3.2.2 Corrective Maintenance

The DCCR is designed to allow a failed unit to be isolated from the active system and to be repaired by maintenance personnel free from interaction with the active ATC system. Corrective maintenance, including the execution of diagnostic programs, can be accomplished without causing a system interruption to NAS en route ATC service.

By specification, the mean time to isolate the failure of an item, repair or replace the item, and verify unit operation shall not exceed a mean time of three hours, and the ninety-fifth percentile of the mean time shall not exceed six hours, including all required activities to analyze, isolate, repair, verify, and certify the correctness of repair actions.

No DCCR system Mean Time Between Failure (MTBF) has been calculated. However, unit-level MTBFs for the DCRP and Display Controller and Switch (DC&S), based on inherent model Reliability, Maintainability and Availability (RMA) predictions are as follows:

- **DCRP**
  Processor with Multisystem Channel Communication Unit (MCCU): 1,500 hours
  Tape Subsystem (Control and Drives): 3,273 hours
- **DC&S**
  DC Rack: 5,617 hours
  RIM: 300,000 hours

(Source: DCCR SPEC, March 30, 1995, section 3.8; DCCR CDRL Item: D011-3, April 25, 1995, pages 299-302.)

3.2.3 Software Maintenance

Table 10-1 provides software maintenance responsibilities at various points after equipment delivery. AOS is responsible for providing direct software engineering support to fielded DCCRs and for directive publication and issuance. It supports the sites in system-wide problems, develops and maintains software, and provides a higher level of assistance to solve difficult NAS problems. See section 10.3 for further detail on software maintenance. (Source: Draft DCCR ILSP, February 21, 1996, Chapter 2.)

3.2.4 System Operations/Monitoring

A DCCR system input/output terminal, the RIOT, will be located at the NOM's position for monitor and control of the system and at the Computer Operator (CO) position. This terminal will present display (element and system) status, configuration and performance. The NOM's RIOT is physically cabled to both DCRPs. The DCRP will provide system status and configuration data to the RIOT, and the same terminal will provide a means of communicating with the DCRP operational and support software. The CO position will be cabled to provide a local terminal and status display for a specific processor. The CO position also will have a local echo printer for hard copy output of the commands entered and responses received in the CO terminal window. The exact details of the interface are provided in the DCRP/RIOT interface control document. (Source: DCCR SPEC, March 30, 1995, section 3.8.13.)

3.2.5 System Certification

The DCCR will provide the NOM the capability to support system-level certification procedures in accordance with FAA Order 6000.30B and the 6100 series maintenance manual. At the lowest level, there will be no element-level certification performed for DCCR; only element-level verification will be performed. (Source: ALM-500 cc:Mail, DCCR System Certification, March 15, 1996.)

3.2.6 Personnel Certification

Personnel certification is a two-phase process consisting of a certification authority phase and a responsibility assignment phase. The certification authority phase requires FAA technical personnel to demonstrate knowledge of the theory of operations and the ability to practically demonstrate this knowledge. The certification responsibility phase is the official assignment to FAA technical personnel to use their authority to certify a specific service/system/subsystem/equipment in the NAS. (Source: FAA Order 3400.3F, AF Maintenance Personnel Certification Program, August 6, 1992, Chapter 3.)

3.3 Implementation Roles of Regional F&E Personnel

No land acquisition or construction/modification is required for the implementation of this program. Regional AF Facilities and Equipment (F&E) personnel will be involved in site preparation and installation planning activities for the DCCR program. The DCCR Product Lead will ensure a project authorization (PA) is issued for the transfer of funds to each Region, prior to delivery of DCCR equipment, for F&E site preparation activities. Each Region will generate its own site preparation schedule to ensure timely completion of these activities. (See Appendix A.) Regional F&E personnel will be in attendance during site survey activities and will support INCO activities performed by the DCCR Contractor personnel, CAI, and JAI as required. (See section 13.2.3.) Any F&E participation in restoration efforts required with the removal of the DCC and associated equipment will be identified in the Disposal Plan, currently under development. Approval of the Disposal Plan is scheduled for May 1996. (Source: DCCR SOW, December 18, 1995, section 3.10; DCCR Program Activities Schedule, Revision #29, February 9, 1996.)

3.4 Implementation Roles of AF Operations Personnel

As indicated above, site surveys and installation and checkout activities are performed by the DCCR Contractor personnel. Systems management personnel will support these activities, as

well as site testing, CAI, JAI and equipment removal and restoration activities as necessary. (See Appendix A.) (Source: DCCR SOW, December 18, 1995, section 3.10.)

3.5-3.19 (Reserved)

3.20 Status Assessment

Beyond the need to define the DCCR system certification requirements and any accompanying impact on AF work force procedures, no AF operational issues/risks have been identified with potential impacts on site implementation.

4.0 AT OPERATIONS

4.1 Summary of AT Operational Impacts

Deployment of the new DCCR equipment is expected to result in positive impacts to AT operations by replacing existing equipment with a system having the same functionality, but with greater reliability, maintainability, availability, and capacity.

4.1.1 Transitory State

Site survey, site preparation, and equipment installation activities are not anticipated to have any impact on AT operations. Participation in these activities by AT personnel is not required, although a number of personnel may be identified as members of a site's implementation team. No flight testing, flight inspections or AT training are required with the implementation of the DCCR system, and no AT participation is anticipated in the removal/relocation of replaced equipment or the facility restoration/refurbishment. Implementation and transition will be performed during off-peak hours as determined for each site, and safety will not be degraded. (Source: DCCR SOW, December 18, 1995, section 3.10.)

4.1.2 Operational State

Implementation of the DCCR program is expected to have little or no effect on AT operations, since DCCR will provide automated en route ATC operational capabilities at least equivalent to existing display channel equipment. Since the DCCR is a rehost of the existing DCC software to a new hardware platform, operations with the DCCR will be transparent to the Air traffic Controller. Information presented on the PVD will be identical in form and content to that of the current system. (Source: Draft DCCR ORDoc, December 20, 1995, section 3.1.)

4.2 AT Procedural Changes

4.2.1 ATC Operational and Management Procedures

Not applicable.

4.2.2 Flight Procedures/Standards

Not applicable.

4.2.3 Administrative and Management Procedures

Not applicable.

4.2.4 Software Verification Procedures

See section 3.2.3.

4.2.5 Inter-facility Procedures

Not applicable.

4.2.6 Personnel Certification Procedures

There are no personnel certification procedures associated with the implementation of the DCCR system. (Source: ATZ-100, February 14, 1996.)

4.2.7 System Back-up/Cutover Procedures

The procedures outlined in the following paragraphs provide for the activities leading to the cutover to the DCCR system. Operational transition from the existing DCC/CDC system to the DCCR will be accomplished gradually, in phases, allowing ARTCC personnel to verify procedures, adaptation data, and operational acceptability of the DCCR system with live ATC operations. Following are the four incremental transition phases:

- **Phase I.** The object of this phase is to allow all of the operational work force to develop confidence in the DCCR during low air traffic activity on the midnight shift. Shadowing should be employed extensively during the early part of this phase and gradually work up to all operational sectors using DCCR. (Shadowing is the observing of a PVD display using DCCR and monitoring an active sector, while the actual ATC takes place on an adjacent PVD using EDARC.)
- **Phase II.** The object of this phase is to allow all of the operational work force to develop confidence in the DCCR during moderate air traffic activity. If possible, this phase should occur at times where only a few sectors normally experience moderate air traffic activity. The sector(s) using DCCR operationally could be shadowed using EDARC to verify that DCCR performs correctly.
- **Phase III.** The object of this phase is to allow all of the operational work force to develop confidence in the DCCR during heavy air traffic activity. If possible, this phase should occur at times where only a few sectors normally experience heavy air traffic activity. The sector(s) using DCCR operationally could be shadowed using EDARC to verify that DCCR performs correctly.
- **Phase IV.** The object of this phase is to conduct a full center shakedown of the DCCR prior to ORD. DCCR should be used as the operational system for a minimum of 24 hours on a typical traffic day. To reach that point, the site may want to use several weekend periods to phase in larger and larger slices of time operating on DCCR with EDARC as backup.

(Source: FAA-DCCR-95-100, CDRL Item: P090, December 15, 1995, page 21.)

4.2.7.1 DCCR Operational Transition Scenarios

Three main scenarios can be used during DCCR operational transition:

1. **Switchforward.** Switchforward is a scheduled transition activity that can be used throughout Phases I, II, and III. During Phase IV it is expected that the primary channel will already be DCCR. The action being performed is to transition controller system inputs and HCS outputs from the DCC/CDC to the DCCR.
2. **Switchback.** Switchback is a scheduled transition activity that can be used throughout Phases I, II, and III. During Phase IV, switchback is not a scheduled transition activity and becomes fallback. The action being performed is to transition controller system inputs and HCS outputs from the DCCR to the DCC/CDC.
3. **Fallback.** Fallback is an unscheduled transition of all sectors from DCCR equipment to the previously operational DCC/CDC system.

It should normally take less than one minute to switch from one display system to the next. If operational certification is required before the current display system is used operationally, then the normal time the site requires for display system certification would apply.

4.2.7.1.1 Switchforward

Switchforward is used at scheduled times for transitioning to DCCR operations. When operational personnel are ready, coordination with all affected parties is complete, and the transition coordinator approves the transition, each controller selects EDARC as the display system for their PVD as soon as their air traffic conditions permit. Once all controllers have transitioned to EDARC operations, operations personnel bring down the DCC/CDC, use the PMCS to select DCCR as the prime channel, and then IPL the DCCR. The transition coordinator and operations personnel will determine what operational/non-operational sectors are to participate in the test and those sectors select DCCR as the display system for their PVD.

4.2.7.1.2 Switchback

Switchback is used at scheduled times for transitioning operational/non-operational sectors from DCCR operations to the DCC/CDC system. When operational personnel are ready, coordination with all affected parties is complete, and the transition coordinator approves the transition, each controller selects EDARC as the display system for their PVD as soon as their air traffic conditions permit. Once all controllers have transitioned to EDARC operations, operations personnel bring down the DCCR, use the PMCS to select DCC/CDC as the prime channel, and then IPL the DCC/CDC. The transition coordinator and operations personnel will determine when the DCC/CDC is ready for operational use, then each controller selects DCC/CDC as the display system for their PVD as soon as their air traffic conditions permit.

4.2.7.1.3 Fallback

Fallback is an emergency transition used during full or partial ATC operations using DCCR and the DCCR fails or operations personnel determine it is no longer usable. The controllers immediately switch to EDARC operations. Operations personnel bring down the DCCR, use the PMCS to select DCC/CDC as the prime channel, and then IPL DCC/CDC. The transition coordinator and operations personnel will determine when the DCC/CDC is ready for operational use, then each controller selects DCC/CDC as the display system for their PVD as soon as their air traffic conditions permit.

4.3 Implementation Roles of AT Personnel

It is anticipated that AT involvement in the implementation of DCCR will focus on participation in the site integration testing, field shakedown testing efforts and development of site switchover procedures before DCCR is accepted for operational use.

4.4-4.19 (Reserved)

4.20 Status Assessment

There is no missing or incomplete information that has the potential to impact the implementation of the DCCR program.

5.0 SYSTEM CONFIGURATION AND ENGINEERING

5.1 NAS Level Architecture

5.1.1 NAS Target State

The DCCR system is intended to be an interim solution to the display and data entry automation needs of en route air traffic controllers and maintenance personnel until the deployment of DSR. The DSR system will be deployed to 20 ARTCCs (plus DSR hardware only to Anchorage) as a replacement system for the existing en route ATC equipment. (See the DSR PIP for a complete description of that program.) Although DCCR operational systems are scheduled for deployment to only the five DCC equipped ARTCCs, DCCR could be used in all 20 ARTCCs. It replaces the DCC, and functionally replaces the associated DGs and RKMs. While the DG and RKM equipment is not necessary for the DCCR system, this equipment is still required for the existing EDARC system. Therefore, the DGs and RKMs will remain at each ARTCC to support EDARC operations. The DCCR will provide for a maintenance environment with superior reliability, maintainability, and availability than the current system, and allow flexibility for future enhancements. Additionally, DCCR will have the capacity to support the workloads derived from expected traffic demand throughout the life of the DCCR system. (Source: Draft DCCR ORDoc, December 20, 1995, sections 1-3; Draft DCCR Transition Concepts and Requirements, FAA-TRO-XXX-00X, September 29, 1995, section 1.3.)

5.1.2 Life-Cycle Projections

The DCCR is an interim system; it is planned for operational use at the five ARTCCs with DCC currently installed until DSR is deployed and ready for operational use. If the current deployment schedules for DCCR and DSR remain unchanged, DCCR systems should be in use no more than 26 months. (Source: DSR and DCCR program schedules.)

5.1.3 Inter-program Interfaces

Not applicable.

5.1.4 Remote Maintenance Monitoring Capability

The status of DCCR equipment will be monitored solely within each ARTCC.

5.1.5 Spectrum Management

Not applicable.

5.2 Effected Platforms

The En Route Facilities Platform is the only platform which will receive operational DCCR equipment. The DCCR APMNI ensures the platform management staff within ANS-220 remains abreast of program activities, schedules and needs. ANS-220 also is a member of the En Route Automation IPT.

5.3 Subsystem Level Architecture

The DCCR functions as a radar data processor, with display functionality, in concert with the HCS. The DCCR system consists of both hardware and software, which will interface to existing

PVD console equipment through a selector switch. The DCCR replaces the DCC/CDC system, RKM, and DG with DCRP, RIOT, DC subsystem, and a RIM. During transition from the existing system to DCCR, the RIM switch provides the capability to select either the DCCR or the DCC/CDC as the prime channel. Subsequent to operational cutover, the RIM switch will arbitrate control of the **R**-Console between operational DC, the redundant DC, and the current DG/RKM path EDARC. See Figure 5-1. (Source: DCCR SPEC, Rev. A, March 30, 1995, Chapter 3; Draft DCCR Transition Concepts and Requirements, FAA-TRO-XXX-00X, September 29, 1995, Chapter 1.)

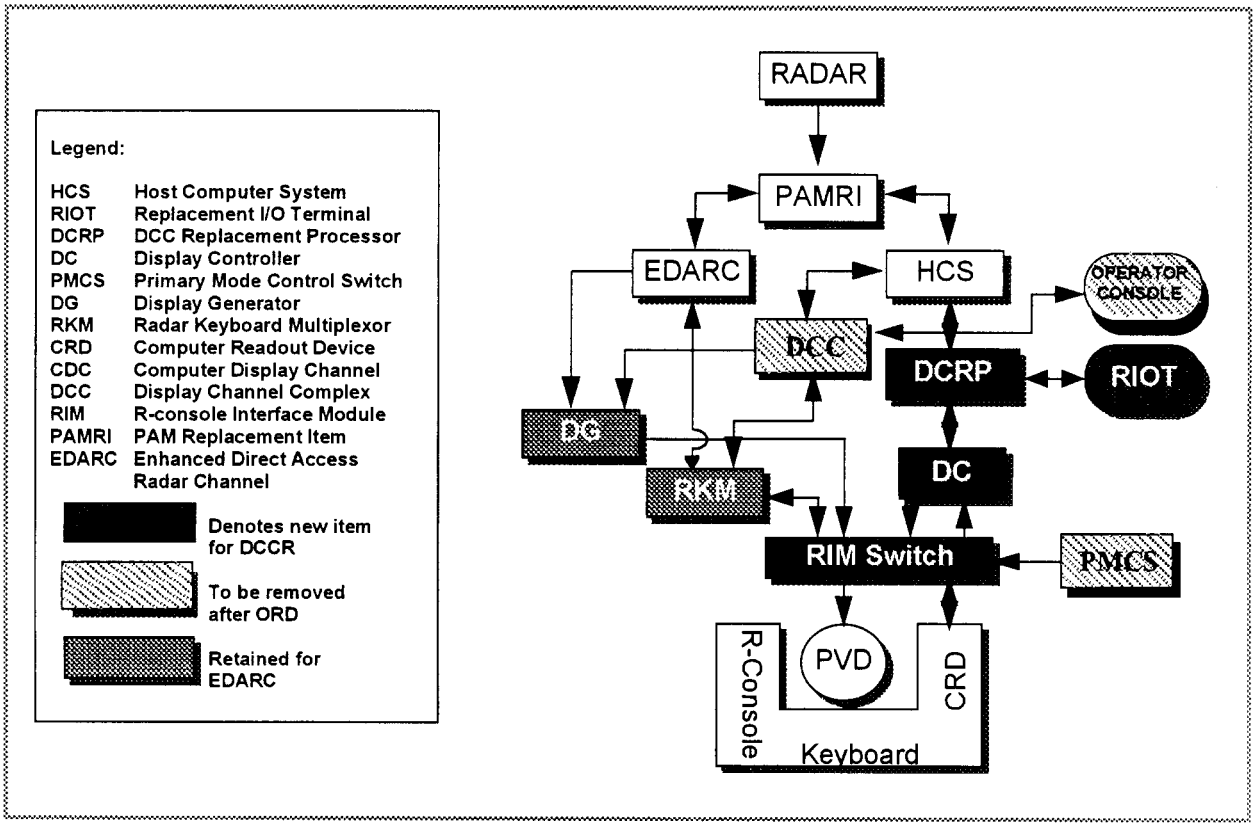

Figure 5-1 DCCR Subsystem Level Architecture

5.3.1 Hardware Components

The DCCR hardware consists of modular components as identified in the following subparagraphs. (Source: DCCR SPEC, March 30, 1995, Chapter 3; Display Channel Complex Rehost (DCCR) PDR/CDR Meeting Material, FAA-DCCR-95-029, CDRL Item: D011-3, April 25, 1995, pages 21-39.)

5.3.1.1 Display Channel Replacement Processor (DCRP)

The Display Channel Replacement Processor is the target execution platform for the rehosted 9020E software system. This processor and its related peripherals comprise the DCCR Processing Subsystem. The system provides the display data management functions which are supplied in the current system by the display channel. While not directly targeted for execution on this processor, the diagnostic and support programs required to build the DCCR software system and to perform service certification are considered part of this subsystem, as they provide key

functions relative to this subsystem. This subsystem has direct interfaces to the RIOT, the HCS, and the Display Controller.

The specific processor selected is the IBM 9221-170 Enterprise System (ES)/9000. Two of these processors are utilized to provide the redundant architecture required in the DCCR. Each processor contains 32 MB of memory and supports 16 System/370 parallel channels, each capable of supporting up to 256 devices with a maximum data rate of 4.5 MB/second. The processor is a rack-mounted, air cooled uniprocessor. Each DCRP contains:

1. A rack-mounted Multi-System Channel Communications Unit (MCCU) which provides up to 256 channel to channel paths. The unit provides the inter processor communications necessary to support health checks between primary and redundant DCRPs while simultaneously providing fully redundant communication paths to the HCS through channels E and F.
2. A channel attached, rack-mounted IBM 3174-21L Establishment Controller that provides the DCRP interface to the RIOT and status displays.
3. A Multi-Station Access Unit (MAU) which serves as a hub for the simple Token-Ring Local Area Network (LAN). The LAN functions as the interface for configuration and maintenance of the MCCU and provides the attachment of the System Console via the Remote Operator Facility.

5.3.1.2 Processor Console (System Console)

The Processor Console interfaces to the MAU and is an IBM PC-2000 personal computer (PC). The main function of the console is as a service/maintenance tool in support of the DCRP.

5.3.1.3 Replacement Input Output Terminal (RIOT)

Within the current DCC/CDC system, operator interaction is provided by a hard copy I/O terminal. The Replacement Input Output Terminal is a standard, commercially-available, 3174-attached IBM-compatible workstation. The workstation provides the capability of having both the status display (KCNF) and a 3270-family terminal reside within a single system footprint. As discussed in section 3.2.4, the RIOT provides a status display for a specific processor at the CO position, while it is configured as a status display for each processor at the NOM position. The NOM's RIOT is physically cabled to both DCRPs, allowing this terminal to support DCRP processor configuration (i.e., switchover). The local echo printer at the CO position is attached to the 3174.

Each RIOT will consist of the following COTS components: an IBM (or IBM compatible) workstation containing an Intel 486 processor (or equivalent); hard drive (250 MB or greater); 3.5" diskette; 16 MB RAM; graphics adapter; 16" (or larger) color display; two 3270 connection features; and a 9 pin dot matrix printer.

In addition, each operator RIOT is connected via a Token Ring adapter to the local system console of the corresponding processor, allowing the RIOT to support the Remote Operator Facility functions of the ES/9000. Three RIOTs are planned for deployment to each designated facility. (Computer Operator RIOTs (2) can IPL the DCCR, but the NOM RIOT cannot.)

5.3.1.4 Display Controller (DC) Subsystem

The Display Controller subsystem consists of rack mounted equipment containing hardware and firmware that provide functions analogous to the DG and RKM. The Display Controller

subsystem interfaces to both DCRPs via direct channel attachment. Each rack consists of three VME bus nests that supports a full configuration of twenty-four **R**-Consoles per nest, with redundancy. In addition to serving as a DCCR-replacement for display refresh memory, the DC will also off-load **R**-Console management tasks such as cursor position update and message composition from the DCCR.

Development of the Display Controller is the product of the Formation Inc. facility in Moorestown, NJ. Each DC consists of three VME bus nests, with each nest supporting eight PVDs. Therefore, each DC is capable of supporting a configuration of 24 PVDs. Although the system can consist of eight DCs, six DCs are planned for deployment (3 DCs on-line and 3 DCs off-line redundant and available). This will allow a full configuration of 72 **R**-Consoles/PVDs with full redundancy.

5.3.1.5 DCCR Switching Subsystem

The DCCR Switching Subsystem consists of the RIM switch and PMCS. This subsystem allows the selection of driving the PVDs with either the DCCR system or the existing DCC/CDC systems that drive the DGs/RKMs. After the DCCR system is operational, this subsystem will permit switching between the operational DC, the redundant DC, and the current DG/RKM for EDARC. (As previously indicated, DGs and RKMs are retained only for EDARC purposes.) Although this subsystem can consist of up to four RIM racks, a total of three RIMs is planned for deployment to each designated site. This switching subsystem of three RIM racks, each capable of supporting 24 PVDs, will support a 72 PVD configuration.

The PMCS design will be a single, two position switch with three outputs, one for each rack at a site. Each output will consist of two wires to allow the switch rack to differentiate between a broken cable and a switch position. A broken cable will not cause any switching to occur. The default selected after initial power-on with a broken cable is controlled by the presence of a wrap plug which replaces the PMCS after transition. Prior to transition, the switch will default to the current DG/RKM position. With the wrap plug installed, a power-on default of DCCR is chosen. This allows full control to occur in the normal case during the product's operational life. The normal case is that there is no DCC or CDC any longer, so the only choices are EDARC and DCCR. By defaulting to DCCR, it allows the user to select the other equipment by a switch at the PVD.

5.3.1.6 Magnetic Tape System

The Tape Control Unit (TCU) for the IBM 3490 tape subsystem is the 3490-A01. It supports the 3490 Model B04 Tape Drive Unit and is a multiple microprocessor-driven control unit with a two Mb dynamic data buffer per logical control unit and a flexible number of channel features. This control unit provides connection of up to eight drives and up to four channel attachments can be specified.

The 3490-B04 Tape Drive Unit is an 18 track, four drive component for the IBM tape subsystem. Standard features include an improved data recording capability, cartridge loaders on each drive, and a two Mb buffer. Each 3490 drive is equipped with a newly packaged, integrated cartridge loader and has a single message display unit containing four readouts. The Model B04 has four tape drives in a single enclosure.

5.3.2 Software Components

The DCCR software requirements will be satisfied as follows:

1. Make the necessary code modifications and transport the current IBM 9020E Display Channel application software to the new COTS ES/9000 processors. This will be accomplished by the reuse of six modules (Top Level Computer Software Components-TLCSC), modification of 14 modules, and development of four new modules.
2. Make the necessary code modifications and transport the current CCCH NAS Stage A Monitor Software, Common data Structure (Compool) and the support software to the new COTS ES/9000 processors. This will be accomplished by the reuse of 17 modules, modifying 65 modules, and developing six new modules. Modifications will be made to the CCCH NAS Stage A Monitor, 16 modules, to accommodate the architecture differences between the DCCR and the current DCC. (Source: DCCR Draft TEMP, January 5, 1996, section 3.1.)

5.3.3 Physical Specifications

The loading of each hardware element does not exceed 125 pounds per square foot, and no removable component weighs more than 50 pounds, unless system design provides mechanical devices for all necessary handling. Table 5-1 provides the estimated physical specifications of the DCCR components. Further detail on component location; Heating, Ventilation, and Air Conditioning (HVAC) requirements; and power requirements is provided in the following chapter. (Source: DCCR SPEC, March 30, 1995, page 3-39; DCCR PDR/CDR Meeting Material, FAA-DCCR-95-029, CDRL Item: D011-3, April 25, 1995, page 66; Preliminary Hardware Data Spreadsheets, January 22, 1996.)

EQUIPMENT COMPONENT	DIMENSIONS	Unit Weight
DCCR Processor Rack	25.5 x 36 inches (6.38 sq. ft.)	1000 lbs.
Processor Console	21 x 20 inches (2.92 sq. ft.)	20 lbs.
RIM Switch Rack	24 x 36 inches (6 sq. ft.)	752 lbs.
Display Controller	24 x 36 inches (6 sq. ft.)	752 lbs.
RIOT	21 x 20 inches (2.92 sq. ft.)	20 lbs.
RIOT Printer	19.5 x 11.3 inches (1.53 sq. ft.)	15 lbs.
Tape Control Unit	30.3 x 34.25 x 70 inches (7.21 sq. ft.)	790 lbs.
Tape Unit	28.5 x 34.25 x70 inches (6.78 sq. ft.)	930 lbs.

Table 5-1 DCCR Physical Specifications

5.4 Human Factors Design Specification

DCCR equipment will be configured and located so that maintenance can be performed on the LRU with access provided to all test points, and modules to be serviced will remain physically stable when in their maintenance position. All equipment will meet the design and maintainability requirements of MIL-STD-1472C unless otherwise specified, and the accessibility requirements of FAA-G-2100F section 3.1.3.4 will be met. The FAA-G-2100F section 3.1.3.4 reference to fastener spacing is replaced by the following: Such fasteners shall be spaced on centers not exceeding 15 inches and shall be located around the entire periphery of the shield or plates. Convenience 120 volt AC, 60 Hertz receptacles will be provided and accessible from the equipment front and rear of each cabinet, and

these receptacles will be provided with power via umbilical conductors (non-critical power) which are separate from the conductors providing power to the DCCR complex. These receptacles will be used to power test equipment, maintenance lights, and tools including heavy duty drill motors and vacuum cleaners which may generate significant electromagnetic interference (EMI). The DCCR shall incorporate necessary design features to prevent DCCR derogation by appliances connected to the convenience receptacles. Equipment will be designed and installed so that the equipment remains upright when subjected to the earthquake floor response spectra shown in AT&T Bulletin 326-130, Pub 51001 Issue 2. Equipment mounted to the cabinets will remain in place and access panels, doors, and drawers will remain in their normal positions under the conditions specified above.

In the area of man-machine interface requirements, the RIOT will be used as both a system input/output device and a DCCR system status display. The RIOT will be used to take the place of the system status display capabilities that are presented on the System Maintenance Monitor Console (SMMC) in the current CDC or DCC system environment. All of the current system indicators represented on the SMMC that are driven by the current display channels will be represented in an equivalent manner on the RIOT system status display screen as appropriate for the new DCCR system hardware architecture. The RIOT will have the capability of handling the computer-human interface necessary to enable off-line program execution of programs on the stand-by DCRP processor. The RIOT will also be used as an input/output terminal for computer-human (man-machine) interfacing with the DCRP operational software. (Source: DCCR SPEC, March 30, 1995, pages 14 and 42.)

5.5-5.19 (Reserved)

5.20 Status Assessment

There are no system engineering or configuration issues/risks at this time which have the potential to impact DCCR implementation.

6.0 PHYSICAL FACILITIES

6.1 Real Estate

6.1.1 Real Estate Requirements

There is no requirement for additional real estate. All DCCR equipment will be located within existing ARTCC facilities.

6.1.2 Real Estate Plans

Not applicable.

6.2 Heating, Ventilation & Air Conditioning (HVAC)

6.2.1 HVAC Requirements

The existing HVAC system within each ARTCC is sufficient to meet the requirements of DCCR, and the removal of the equipment being replaced by DCCR will decrease overall facility HVAC requirements. Table 6-1 provides the location and estimated (total) DCCR HVAC requirements, by component for a typical DCCR site. (Note: equipment for New York ARTCC will be located in the Operations Wing Basement.) (Source: AUA-230 DCCR Element Information Package, August 28, 1995; DCCR PDR/CDR Meeting Material, FAA-DCCR-95-029, CDRL Item: D011-3, April 25, 1995, page 67; Preliminary Hardware Data Spreadsheets, January 22,1996.)

SYSTEM COMPONENT	LOCATION at SITE	Total kBTU/hr
DCCR Processor Rack (4)	HOST Computer Room*	61.43
Processor Console (2)	HOST Computer Room*	0.74
RIM Switch Rack (3)	Automation Wing Basement	13.82
Display Controller Rack (6)	HOST Computer Room*	27.65
RIOT (3)	NOM and CO Positions	0.92
RIOT Printer (2)	HOST Computer Room*	0.92
Tape Control Unit (1)	HOST Computer Room*	6.14
Tape Unit (1)	HOST Computer Room*	0.00

*Except for New York (See paragraph 6.2.1)

Table 6-1 DCCR HVAC Requirements

6.2.2 HVAC Plans

Not applicable.

6.3 Cables

6.3.1 Cable Routing/Raised Floor Requirements

Required cable lengths and cable routing for each deployment site, to include identification of any necessary wall or floor penetrations, were determined during individual site surveys. Where floor or wall penetrations are required, the cognizant region will ensure completion of the work before Contractor site fit-up begins. Routing of cables within the HOST computer room will be beneath the raised floor. Because DCCR is an interim program, cables may be routed in bundles beneath raised floors when necessary. In areas where cables cannot be routed beneath raised floors, cable trays, raceways, and ladders will be used. Maximum cable length restrictions follow:

- DCRP to HOST (4 cable sets): 400 feet
- RIOT to DCRP (1 cable/RIOT): 569 feet
- Processor Console to DCRP (1 cable): 20 feet
- DCRP to DC (24 cables, 12/DCRP): 100 feet
- TCU to DCRP (1 cable): 400 feet
- DCs to RIMs (288 cables, 48/DC)*: 300 feet
- PMCS to RIM (3 cables): 300 feet
- RIM to PVD (144 cables, 48/RIM)*: 300 feet plus 25 foot pigtail to DGs
- RIM to DG (72 cables)*: 150 feet
- RIM to RKM (72 cables)*: 150 feet

Note: * Denotes maximum configuration. The actual configuration will vary by site for the number of PVDs in use.

(Source: AUA-230 DCCR Element Information Package, August 28, 1995.)

6.3.2 Cable Plans

Cable plans will be included in the individual CDRL DAT-01 packages provided to each deployment site, as determined during site surveys. The Contractor will supply and install all cables. All cables delivered to the sites as part of a DCCR configuration will be plenum-rated, except for the channel cables which will be non-plenum rated, and will conform to Federal, State and Local regulations. The DCCR Specification states that connector cables will be sufficient to connect all equipment as required for site installation.

All cables will be labeled at both ends. The Contractor will use a standard identification and naming scheme and maintain a map of the hardwired or through-the-wall cabling using an automated support approach. (Source: DCCR TP, December 15, 1995, page 66; DCCR System Integration & Implementation (SI&I) Lead/APMNI mtg. November 1995.)

6.4 Power

6.4.1 Power Requirements

The DCCR system will operate from an electrical power source of single phase, 3-wire, 208 alternating current (AC) volts +6% to 8%, 60 Hertz (Hz) +/- .5 Hz. The existing power system within the ARTCCs is sufficient to meet DCCR equipment requirements. The additional loads

experienced during transition to the DCCR will not be significant, and the implementation of DCCR, including the removal of the DCC/CDC and related systems, will result in lesser loads than those currently experienced. Additional circuit breakers and Critical Power Panels may need to be installed to accommodate DCCR. This will be determined during individual site surveys and could depend on the location of various pieces of equipment. If additional circuit breakers or power panels are required, the cognizant region will ensure completion of the work prior to Contractor site fit-up begins.

The DCCR system equipment prime power feeds meet the line harmonic distortion limits of FAA-G-2100F. This will be tested at the FAATC prior to hardware delivery to the first operational site.

The estimated power requirements and (total) loads of various DCCR components at a typical DCCR site are provided in Table 6-2. (Note: equipment for New York ARTCC will be will be in the Operations Wing Basement.) (Source: DCCR SPEC, March 30, 1995, page 3-41; AUA-230 DCCR Circuit Breaker & Power Panel Requirements Package, September, 18, 1995; DCCR PDR/CDR Meeting Material, FAA-DCCR-95-029, CDRL Item: D011-3, April 25, 1995, pages 41-59; Preliminary Hardware Data Spreadsheets, January 22, 1966.)

				Total Load (KW) on Power Bus		
Component	Location at site	Voltage	Phase	Critical	Essential	Commercial
DCCR Processor Rack (4)	HOST Computer Room*	208	3	18.00		
Processor Console (2)	HOST Computer Room*	120	1	0.22		
RIM (3)	Automation Wing Basement	208/120	3	4.05		
Display Controller Rack (6)	HOST Computer Room*	208/120	3	8.10		
RIOT (3)	NOM and CO Positions	120	1	0.27		
RIOT Printer (2)	CO Position	120	1	0.27		
Tape Control Unit (1)	HOST Computer Room*	208	3	1.80		
Tape Unit (1)	HOST Computer Room*	208	3	0.00		

*Except for New York (See paragraph 6.4.1)

Table 6-2 DCCR Power Requirements

6.4.2 Power Plans

A power plan will be developed by each site following its site survey and receipt of the Contractor's Quick Look Package containing necessary site preparation action items. No significant actions are anticipated, given the existing power systems in the ARTCCs.

6.5 Physical Security & Personnel Safety and Health

6.5.1 Physical Security & Personnel Safety and Health Requirements

6.5.1.1 Physical Security

The DCCR system is protected by a password protection scheme which restricts access to authorized personnel. This password protection is at the operating system level and at the application level.

It is expected that DCCR equipment will be subject to the same site security procedures as existing NAS equipment.

6.5.1.2 Personnel Safety and Health Requirements

The DCCR equipment consists of COTS mainframe, microcomputers and peripheral items. Neither of these items nor the maintenance requirements on the system are anticipated to adversely affect the health or physical safety of DCCR users.

6.5.2 Physical Security & Personnel Safety Plans and Procedures

No additional physical security or personnel safety requirements will result with the implementation of the DCCR program.

6.6 Environmental / HAZMAT

6.6.1 Environmental / HAZMAT Requirements

6.6.1.1 Environmental Monitoring

No environmental impact is anticipated with the implementation of DCCR. No additional real estate is required for this system, and the DCCR equipment will be located in existing ARTCC space.

6.6.1.2 Handling of Hazardous Materials

Site Surveys were completed for the five ARTCCs scheduled to receive DCCR, with no asbestos encountered.

6.6.1.3 Special Area Considerations

The Contractor will install seismic anchors under raised floors for all DC&S equipment. Anchors will be bolted to the concrete floor slab below the raised floor.

6.6.2 Environmental / HAZMAT Plans and Procedures

There is no anticipated impact on DCCR program milestones due to environmental issues or hazardous materials. Any hazardous materials that might be disturbed during site preparation, fit-up, equipment installation, or removal of replaced equipment is the responsibility of the individual sites and will be appropriately monitored by qualified personnel. Any hazardous materials encountered will be handled and disposed of in accordance with existing directives. The Disposal Plan for the DCC/CDC and related systems, scheduled for completion in May 1996, will address the handling of hazardous materials. Funding for these requirements will be provided to the Regions by the DCCR program office.

6.7 Grounding, Bonding, Shielding & Lightning Protection

6.7.1 Grounding, Bonding, Shielding & Lightning Protection Requirements

All AC power and grounding interconnections must conform to the requirements provided in the current edition of the National Electric Code. The specification requires that fuses in the electrical power source are in accordance with ANSI C62.41 for indoor use. The existing grounding, bonding, shielding and lightning protection in the ARTCCs are anticipated to provide

sufficient protection for the DCCR system. Any additional required protection will be identified in individual site surveys. (Source: DCCR SPEC, March 30, 1995, page 3-41.)

6.7.2 Grounding, Bonding, Shielding & Lightning Protection Plans

The Regions will ensure that any additional multipoint ground plates, as determined during individual site surveys, are installed prior to the Contractor beginning site fit-up. The Contractor will connect the equipment grounding cables to these multipoint ground plates. (Source: FAA/Contractor meeting following Chicago ARTCC site survey, October 19, 1995.)

6.8 Space

6.8.1 Space Requirements

There is sufficient space existing in the ARTCCs to accommodate the DCCR equipment. With the exception of New York ARTCC, equipment location at all identified deployment sites is standardized as indicated in Table 6-3. For New York, equipment will be located in the Operations Wing Basement. Contractor work space for fit-up requirements and administrative tasks is provided by use of existing floor space in the DSR Control Room, or other appropriate space, and by the siting of a Contractor trailer, equipped by the sites with telephone and electrical hook up. Space for site spares and technical documentation is available and will be provided in the HOST computer room adjacent to the DCCR equipment located in that area. (Source: DCCR PDR/CDR Meeting Material, FAA-DCCR-95-029, CDRL Item: D011-3, April 25, 1995, page 66; Preliminary Hardware Data Spreadsheet for Chicago ARTCC, January 22, 1996.)

Table 6-3 DCCR Space Requirements

		Space Requirements (inches)			
Component	**Location**	**Height**	**Width**	**Depth**	**Clearance**
DCCR Processor Rack	HOST Computer Room*	62.00	25.5	36.00	3 ft. front/rear
Processor Console	HOST Computer Room*	18	21	20	N/A
RIM Switch Rack	Automation Wing Basement	79	24	36	3 ft. front/rear
Display Controller	HOST Computer Room*	79	24	36	3 ft. front/rear
RIOT	NOM & CO Positions	18	21	20	N/A
RIOT Printer	HOST Computer Room*	7.9	19.5	11.3	N/A
Tape Control Unit	HOST Computer Room*	70	30.3	34.25	N/A
Tape Unit	HOST Computer Room*	70	28.5	34.25	N/A
Spare Parts	Site specific				50 sq. ft.
Technical Documentation	Site specific				N/A

*Except for New York (See paragraph 6.8.1)

Table 6-3 (Cont.) DCCR Space Requirements

6.8.2 Space Allocation Plans

Preliminary site visits conducted by FAA headquarters personnel at each of the DCCR deployment sites resulted in identifying standardized locations for the DCCR equipment. (New York ARTCC is an exception.) This provided each site the opportunity to identify the movement of existing equipment or furnishings necessary to accommodate DCCR equipment. Although specific space allocation plans will be developed by each site following individual site surveys, no requirement for staging or phasing of equipment is anticipated.

6.9 Construction & Modification

6.9.1 Construction & Modification Requirements

No construction is required to meet the space needs of DCCR. Any modifications, such as wall or floor penetrations, will be identified during site surveys and accomplished prior to the Contractor beginning site fit-up.

6.9.2 Construction & Modification Plans

The plans for any building modifications required to support DCCR implementation will be developed by the effected site, with assistance as required from the applicable Region, following site survey. These plans will ensure any required modifications are complete before the Contractor begins site fit-up. Modifications will be accomplished by the site, and funding will be provided to the Region by the DCCR program office.

6.10 Telecommunications

6.10.1 Telecommunications Requirements

The DCCR will use the communications system currently installed in each facility.

6.10.2 Telecommunications Plans and Procedures

Not Applicable.

6.11 Water and Sewer

6.11.1 Water and Sewer Requirements

No additional water and sewer requirements are needed with the implementation of DCCR.

6.11.2 Water and Sewer Plans

Not applicable.

6.12 Roadways and Access

6.12.1 Roadways and Access Requirements

No additional roadways or access are needed with the implementation of DCCR.

6.12.2 Roadways and Access Plans

Not applicable.

6.13-6.19 (Reserved)

6.20 Status Assessment

No physical facilities issues/risks that have the potential to impact the implementation of DCCR have been identified to date.

7.0 FINANCIAL RESOURCES

7.1 Life-Cycle Cost Summary

The costs presented in Table 7-1 are an allocation of the baselined DCCR production budget. The allocation is based on the cost distribution provided in the Independent Government Cost Estimate (IGCE) completed by AUA-200 in November 1995, and updated in January 1996.

Component	Sys. Devel./ Acq.	Sys. Depl./ Impl.	Sys. Maint.	Replace Fail. Comp.
Prime Mission Equipment	14,610,000	10,350,000	1,740,000	1,220,000
Other Cost	2,040,000	1,530,000	2,410,000	0
Subtotal	16,650,000	11,880,000	4,150,000	1,220,000
Total				33,900,000

Table 7-1 DCCR Life-Cycle Cost Summary

7.2 Facilities and Equipment (F&E) Budget

The Facilities and Equipment budget for DCCR is provided in Table 7-2. Although this PIP addresses the implementation of the Production DCCR program at the five DCC sites, the F&E costs associated with the Prototype DCCR are provided here for information. Due to the urgent nature of the DCCR program, no reduction or elimination of required funding is anticipated.

	FY 95	FY 96	FY 97	FY 98	FY 99	Total
Prototype	11.70	18.00	0.00	0.30	0.00	30.00
Production (5 sites)*	10.00	20.00	1.60	1.60	0.70	33.90
Total	21.70	38.00	1.60	1.90	0.70	**63.90**
* *Based on pending Financial Baseline Change Notice* (FBCN). Figures are in $M.						

Table 7-2 DCCR Facilities and Equipment Budget

The following are F&E funded activities:

- DCCR System Development/Acquisition (both prototype and production);
- FAATC delivery, installation and integration (prototype);
- Site survey and preparation, including all HVAC and property upgrades;
- Site delivery, installation and integration;
- Removal of replaced equipment, including HAZMAT concerns;
- Restoration of site;
- Factory, system and acceptance testing;
- Production acceptance testing;
- Site acceptance testing;

- Operational test and evaluation;
- Shakedown testing;
- Maintenance and supply support.

No funding risks associated with these areas are anticipated due to the urgency of the DCCR program. Where cost items will be managed at the regional level, the DCCR Product Lead will ensure the timely transfer of funds to each region by issuing the necessary PAs. (Source: DCCR Program Office, March 20, 1996.)

7.3 Operations and Maintenance (O&M) Budget

There are no O&M budget requirements for the DCCR program. All funding is provided in the F&E budget. (ACT-205, February 12, 1996.)

7.4 Research, Engineering and Development (RE&D) Budget

7.4.1 RE&D Budget Requirements

DCCR was originally initiated in 1992 as a task order under the Advanced Automation System (AAS) contract. Loral (then IBM) was tasked to research and design a system that would replace the display channels of the current Air Traffic Control System only. The task order was terminated as a result of budget constraints; $2,514,293 in RE&D funding was spent in FY 92 on this task order. No RE&D funds have been spent on the DCCR production contract. (Source: DCCR Program Office, January 5, 1996.)

7.5-7.19 (Reserved)

7.20 Status Assessment

DCCR maintenance was originally to be performed by CMLS only. However, ALM-500, in conjunction with site personnel and through concurrence with AAF-1, has determined that it is more beneficial to the government to perform maintenance using site maintenance personnel. This impact on F&E and O&M budget requirements is currently being researched, and will be resolved through the FY 98 CIP process. (Source: DCCR Program Office, January 5, 1996.)

8.0 HUMAN RESOURCES

8.1 Human Resource Management

8.1.1 Impacts of Acquisition on Human Resource Management

The following subparagraphs summarize potential impacts of the DCCR acquisition program on each of the human resource management elements.

8.1.1.1 Personnel Security

Implementation of the DCCR at FAA facilities is not expected to have any negative impacts on the security of facility personnel. Contractor personnel involved in the DCCR implementation will be required to meet established security requirements of each facility receiving DCCR.

8.1.1.2 Relations with Local Communities

The implementation of the DCCR will have no impact on relations with the local community.

8.1.1.3 Relations with Aviation Community

The implementation of the DCCR will improve the reliability of en route ATC equipment, which in turn should provide for excellent relations with the aviation community utilizing these ATC services.

8.1.1.4 Employee Work Environment

Improved reliability and maintainability of the en route ATC system will result from the implementation of the DCCR system. This increased reliability and maintainability is anticipated to improve the work environment of both the AF and AT work forces. There are no radiation hazards associated with this system, and no additional Occupational Safety and Health Administration (OSHA) or safety concerns result from the implementation of DCCR.

8.1.1.5 Employee Job Satisfaction

A positive impact to job satisfaction is anticipated to result with the implementation of the DCCR, due to its greater reliability and maintainability. The demands on personnel resulting from the failure of equipment currently being experienced by both AT and AF personnel are expected to decrease with DCCR. The implementation of the system should be transparent to ATC personnel, and the staffing requirement to maintain the DCCR system is not expected to change significantly from the present level.

8.1.1.6 Labor-Management Relations

As outlined in Chapter 20 of the FAA Program Manager's Guide, the DCCR Product Lead must provide the necessary program information to the Office of Labor and Employee Relations so that the national unions can be notified in advance of significant milestones, such as field evaluation, operational test and evaluation, initial operational capability, and operational readiness date. In addition, any solicitation of input from bargaining unit employees or participation in workgroups must be made at the national level. Contacts with the unions at the national level are made through the Office of Labor and Employee Relations, ALR-100. The Product Lead must ensure familiarity with the negotiated agreement provisions of the various national units to ensure time

frames are met and compliance with specific provisions is accomplished. The national unions now have bargaining rights on the substance and impact of changes and new technology of performing work. Implementation of a change or new technology cannot be made until all obligations with the union are met.

8.1.1.7 Organizational Structure(s)

DCCR will have no impact on the organizational structure of an ARTCC.

8.1.2 Human Resource Implementation Strategies

At the Headquarters level, within the organization under the Assistant Administrator for Human Resources, a DCCR focal point should be appointed from within the Human Resource's staff who will be responsible for directing the personnel efforts in support of the DCCR development through final acceptance by the FAA. The focal point will be responsible for coordinating DCCR matters within the Human Resource management structure, including but not limited to:

1. Maintaining contact with the DCCR Product Lead to ensure current documents are reviewed for possible impacts on Human Resources.
2. Maintaining contact with the Chief Scientific and Technical Advisor for Human Factors to review documents affecting the Contractor's inputs required by the Human Factors/Engineering Plans.
3. Maintaining liaison with other Headquarters Staff who are monitoring the status of the DCCR.
4. Ensuring that the Regional and Facilities managers are advised of the current Human Resources impacts in support of the DCCR.
5. Providing regional and field managers the latest FAA policy guidelines on off-duty education and internal FAA training.

Regional and Facility managers should consider the following approaches for addressing the Human Resource management impacts listed previously:

1. Identify personnel for participation in DCCR implementation planning and coordinating activities.
2. Coordinate with the Contractor to ensure that timely access is granted for their personnel.
3. Interface with the local community and its leaders to ensure that they are aware of any impact of DCCR on the local area.
4. Coordinate with the local aviation community through meetings and briefings to inform them of the improvements to ATC service to be realized with the implementation of DCCR.
5. Inform employees that there will be training associated with the implementation of DCCR and that a training schedule will be provided in accordance with labor management agreements, giving personnel as much advance notice as possible.
6. Ensure employees that FAA training will provide career-specific job knowledge so that they may keep abreast of the (possible) changes brought about by the deployment of the DCCR (and associated systems).
7. Coordinate employee implementation briefings with the Regional Office of Labor and Employee Relations.

(Source: Human Resources Transition Planning Workbook, undated, Chapter 4.)

8.1.3 Security Clearances

Normal security procedures will apply as specified in FAA Order 1600.54. Security processing may be required for site Contractor personnel involved in site preparation, installation, test and maintenance activities. Sector or security personnel may be required to perform escort responsibilities. Individual sites will coordinate access through existing local security channels and procedures (e.g., building passes).

8.2 Workload Impacts

8.2.1 Operational Workload Impacts

No impact to Regional (AF or AT) or System Management Office (SMO) operational workload is anticipated to result from the introduction of the DCCR system. At the facility level, the implementation of the DCCR system will be transparent to ATC personnel, and no impact on the AT workload is anticipated. Given the improved reliability and maintainability of the DCCR, no significant operational workload impact on the AF work force is anticipated after the transition to DCCR. Following this transition and the removal of the replaced equipment, less equipment will require maintenance.

8.2.2 Implementation Workload Impacts

As indicated in sections 3.1 and 4.1, no significant impact on AF or AT workload is anticipated during the implementation of the DCCR. AF, AT and AFS personnel will be involved in the various phases of implementation of the program, and they should be members of any implementation teams formed early in the planning phase to address any unique facility requirements. These teams should be composed of an adequate number of personnel from the region, SMO and facility levels to ensure sufficient expertise and resources are available for the efficient implementation of the DCCR program. In addition to planning, these teams should be available to advise or assist the Contractor, as required, during site survey, site fit-up and other implementation activities. Table 9-2 provides the resource estimates (personnel/staff months) necessary for the sites to support each area of testing. Also, see Appendix A for specific implementation activities and their estimated durations. Specific numbers and types of personnel, as well as the work hours per activity required, are unknown at this time, but will be provided following first site installation.

8.2.3 Staffing Support

The DCCR is a short-term, interim program, and no increases to staffing at the regions, SMOs or facilities are anticipated to result from the implementation of this system. However, during the transition to DCCR, some overtime may be required by both AF and AT work forces. This could be necessary in the AF work force due to some personnel attending DCCR training while the remaining work force maintains the DCC equipment and participates in DCCR implementation activities. For the AT work force, overtime may be required due to the transition process. (See section 4.2.7.)

The estimated breakout of AF work in staff years for fiscal years 1996 through 2000 for the implementation of DCCR, based on eight systems being delivered, was provided by AUA-230 Implementation Resources Requirements Memorandum in August 1995. That estimated breakout

provided the staff years of work necessary from the initial engineering phase through installation of the equipment. The total estimated staff years, per Cost Class are as follows:

Cost Class 1 (Plant Engineering)	3.47
Cost Class 2 (Electrical Engineering)	6.27
Cost Class 3 (Construction)	0.80
Cost Class 4 (Installation)	3.13
Cost Class 5 (Flight Check)	0.00

8.3 Training

8.3.1 Training Requirements

The FAA is responsible for the development and conduct of training required to support implementation of the DCCR. A training conference was held in January 1996, and course requirements and curricula are in the early stages of development. Information in the following paragraphs is preliminary and subject to modification as course development matures. Any modifications will be provided by the program office. The Contractor will provide support for course development and follow-on training in support of DCCR. In course development, the Contractor will provide a six month level of effort to support development of training for the DCRP and the DC&S subsystems. This support will include training development, prototype training and course validation. Since there is no separate DCCR system available for training, effective use of the system at the FAATC to support initial course development is anticipated. (Source: DCCR TP, December 15, 1996, section 1.6; DCCR SOW, December 18, 1995, section 3.5.4.)

8.3.1.1 F&E Personnel Training Requirements

Not applicable.

8.3.1.2 AF System Operations Training Requirements

DCCR training required for AF personnel is primarily training on the operation of the DCCR system: bringup, reconfiguration, status display, messages, initial problem determination, and 1st and 2nd level hardware and software maintenance. Contractor support to field sites will expire five months after CAI, but 2nd level support for hardware and software maintenance will encompass two man years each. For this reason, the development and implementation of 1st level training will have priority.

8.3.1.3 Air Traffic Training Requirements

There are no AT training requirements associated with the implementation of DCCR. ATC operations and interface remain unchanged with DCCR.

8.3.1.4 Aviation Standards Training Requirements

Not applicable.

8.3.1.5 Flight Standards Training Requirements

Not applicable.

8.3.1.6 Depot Maintenance Training Requirements

Not applicable. Supply support for DCCR will be provided by a contractor for the life of the system, beginning with CAI for the first site. (See sections 10.3.3 and 10.4.1.)

8.3.2 Training Plans

DCCR training development and implementation is the responsibility of AFZ-100. The purpose of this training is to provide qualified technical support for the interim DCCR system until the replacement DSR system is introduced. Training will provide field technicians with the capability to isolate and diagnose system faults and remove and replace to the Line Replaceable Unit (LRU) level. (Source: Draft DCCR ILSP, February 21, 1996, section 6.4.1.)

8.3.2.1 F&E Personnel Training Plans

Not applicable

8.3.2.2 AF System Operations Training Plans

Training will be conducted by classroom lecture, on-line tutorials, DCCR laboratory hands-on, or any other method proposed by the Contractor and approved by FAA. DCCR overview courses and hardware maintenance training courses will be administered on-site by the Contractor following system installation at each site. Software maintenance training will be conducted at the FAA Academy. Completion of training will result in field facility personnel and instructors having the skills and knowledge necessary to use, maintain, and support a complete training program that effectively utilizes the DCCR.

The target audience for 1st level training will include Operational Test and Evaluation (OT&E) team members, plus those technicians who will maintain and support the DCCR system at ARTCCs and the FAATC (ACT-421); 2nd level training will be provided for AOS-300. Training development and presentation will address only those personnel now involved with DCC support and will not be of sufficient detail to be used as follow-on attrition training. The training window for on-site 1st level training is expected to be during the period the Contractor is providing on-site maintenance.

The typical DCCR Overview course to be held at operational DCCR sites and the FAATC will have a class size of approximately 12 people. The composition of the classes is anticipated to be NOMs, Computer Operators and Supervisory personnel from various ARTCCs and AOS personnel. Two courses of approximately 40 hours duration each are currently planned for each site, with each ARTCC to have a total of about 22 personnel trained; approximately 5 personnel each from AOS-370 and AOS-300 will receive this training. The lecture portion of the course will consist of System Familiarization, Hardware Overview, and System Data Flow. The laboratory portion of the course will consist of physical hardware identification.

Current planning is for one hardware maintenance course of approximately 160 hours to be conducted at the FAATC. Attendees will include OT&E team members, Field Technicians, Systems Specialists, and 2nd level hardware maintenance personnel. Like the overview course, classes typically will be composed of 12 personnel; attendees will be from various ARTCCs, as well as from the FAATC and AOS-300. Each ARTCC and AOS-300 will have approximately 11 personnel trained through these hardware maintenance courses, while the FAATC will have about

six trained. The lecture portion of the course will consist of System Familiarization, Hardware Overview, System Data Flow, Software Overview, Hardware Component Operation, System Operations, and System and Equipment Diagnostics. The laboratory portion of the course will consist of Operation of the Hardware Components, System Operation, Diagnostics and Analysis, and System Fault Detection and Recovery.

Software maintenance training will be conducted in two courses of 80 hours duration by the FAA Academy. Each ARTCC will have a quota for approximately two personnel, one System Specialist and one Technical Specialist. AOS-300 and AOS-370 will have quotas for approximately nine and five personnel, respectively. The lecture portion of the course will consist of System Familiarization, Hardware Overview, System Data Flow, COTS Software, Software Modifications introduced as a result of the rehosting of the 9020E software, and Adaptation Modifications. The laboratory portion of the course will consist of System Software Maintenance, Adaptation, and Fault Analysis.

8.3.2.3 Air Traffic Training Plans

Not applicable.

8.3.2.4 Aviation Standards Training Plans

Not applicable.

8.3.2.5 Flight Standards Training Plans

Not applicable.

8.3.2.6 Depot Maintenance Training Plans

Not applicable.

8.4-8.19 (Reserved)

8.20 Status Assessment

The specific implementation workload impacts of DCCR on receiving sites need to be further defined, and the full human resource impact on the Academy curriculum must be determined.

9.0 TEST AND EVALUATION

9.1 Overview of Test Program

Testing proceeds from the Contractor's factory to the FAA Technical Center to the site. Developmental Test and Evaluation (DT&E), OT&E, and Independent OT&E (IOT&E) will be conducted in association with the on-going Prototype contract. On-site Production Acceptance Test and Evaluation (PAT&E), and Field Shakedown will be conducted in association with the Production contract. The newly developed hardware items will undergo Factory Acceptance Test (FAT) at the Contractor's facility prior to shipment to the five field sites. Commercial Off-The-Shelf (COTS) hardware items will be shipped directly to the sites. DT&E Software Integration Testing, System Testing and System Acceptance Testing, as well as OT&E, will be conducted at the FAATC. The FAATC can provide the interfaces with other National Airspace System (NAS) equipment and subsystems, and test tools (e.g., simulation), so that testing can be conducted without impacting actual Air Traffic operations. An Operational Capability Demonstration (OCD) currently is not required for the DCCR program. (Source: DCCR Draft TEMP, January 5, 1996, section 1.3.)

9.1.1 Government Test Program

The components of the DCCR Government-conducted test program are: OT&E, conducted at the FAATC; IOT&E, conducted at the first operational DCCR site (Chicago ARTCC); and Field Shakedown, conducted at each of the five DCCR sites. (Source: DCCR Draft TEMP, January 5, 1996, sections 4.5.3 and 8.2.)

9.1.1.1 Operational Test and Evaluation (OT&E)

Although OT&E activities take place during the entire period of DCCR development, formal OT&E testing is scheduled from August 16, 1996 to October 4, 1996. The scope of the DCCR OT&E includes verification of all the Critical Performance Parameters (CPPs), Critical System Characteristics, Critical Operational Issues (COIs), and Minimum Operational Performance (MOPs) which are not validated during the DT&E. OT&E tests are conducted by personnel from ACT-230, AOS-300, AOS-30 and the field sites. These FAA personnel are supported in their activities by the prime Contractor's personnel.

Early in the development process, ACT-230 conducts preliminary assessments of the DCCR to ensure that operational requirements are adequately specified and that the developing system is meeting operational needs.

Once sufficient system integration has occurred at the FAATC, enabling use of the system by operational personnel, operational and technical evaluations will be conducted. Operational evaluations will be conducted by AF and AT user teams by exercising operationally realistic simulations on the system. These operational evaluations will help assess the operational capabilities of the system, and if necessary, suggest design and functionality changes, as well as changes to operational procedures to meet the end-user's needs. Technical capabilities and performance characteristics of the system will be evaluated through test activities conducted by ACT-230. In addition, early assessments of system functionality will be made through the use of the system during the OT&E test procedures development process.

OT&E commences after Government acceptance of the DCCR at the FAATC. OT&E at the FAATC focuses on the following specific objectives:

1. Determine if AT and AF personnel can safely and efficiently perform their jobs using the DCCR.
2. Identify possible operational problems so that corrections can be made.
3. Support the collection of system reliability measurements and safety-related data.
4. Evaluate the accuracy and completeness of Contractor-supplied documentation.
5. Evaluate the effectiveness of operational procedures developed or modified for the DCCR, as well as those operational procedures presently in use.
6. Determine that the DCCR transitioning from the existing system can be accomplished safely and effectively.

Post-acceptance OT&E is a structured test program conducted with test participants from operational field sites. It includes IOT&E and Field Shakedown Testing conducted on site.

9.1.1.2 Independent Operational Test and Evaluation (IOT&E)

The DCCR program was directed by ATS-1 to include an IOT&E. IOT&E for DCCR will be conducted following the Independent Operational Readiness Declaration (IOTRD) by ARA-1. IOTRD announces the readiness of the system and the availability of resources required to conduct IOT&E. IOT&E is used to verify that the DCCR system is operationally effective and suitable. An Air Traffic Services Test Team (ATSTT) will conduct IOT&E at the Chicago ARTCC. This team will be led by an assigned Office of Independent Operational Test and Evaluation Oversight (ATQ) specialist, with members from Air Traffic and Airways Facilities. The objective of DCCR IOT&E is to confirm the operational readiness of the DCCR to be part of the NAS. The DCCR IOT&E is based on COIs from the Operational Requirements Document, and is conducted in support of the Deployment Readiness Review.

IOT&E will be conducted during a two week period in conjunction with Field Shakedown testing by FAA personnel who are trained and experienced in the current DCC or CDC systems. During IOT&E, Chicago ARTCC personnel will operate and maintain the system. The ATSTT will make the operational suitability and effectiveness assessment of the DCCR after review of IOT&E data.

Throughout the course of the DCCR program, ATQ will monitor program activities and remain aware of system status and issues. The ATSTT will monitor DT&E, OT&E and site testing activities and may identify risk areas that could be further addressed during IOT&E. These risk areas will be communicated to the DCCR Program Office and the En Route Branch (ACT-232) prior to IOT&E.

9.1.1.3 Field Shakedown

The first site scheduled for DCCR is the Chicago ARTCC. Field Shakedown at the Chicago ARTCC will occur from July through October 1996. The other sites to be configured with the DCCR are: Ft. Worth, Washington, Cleveland, and New York City. The purpose of the Field Shakedown is for FAA regional and local personnel to demonstrate their proficiency to completely maintain and operate the DCCR in the NAS. Table 9-2 provides the estimated personnel requirements for testing.

9.1.2 Contractor Test Program

The components of the DCCR Contractor-conducted test program are: factory testing, conducted at the Contractor's or subcontractor's facility; DT&E, conducted at the FAATC; and PAT&E, conducted at the five DCCR sites.

Phases one and two of the acquisition process, the Concept and Demonstration phases, as defined in FAA Order 1810.1F, have been informally completed. The first objective of the third phase, Development, is to qualify the functional and performance specification requirements on prototype or limited production hardware or software via an established test plan. The second objective is to ensure the NAS interoperability, effectiveness/suitability, and supportability/ maintainability of the hardware or software. The fourth phase, Production, normally follows the successful completion of the Development phase and the DRR deployment decision, but due to the urgent and compelling need for the DCCR system, the Production phase was entered concurrent with the Development phase. Contractor-conducted testing will be performed on each individual deliverable item at each deployment site to verify that end-items conform to applicable specifications, are free from manufacturing defects, and are substantially identical to the qualified hardware.

Configuration Management (CM) is essential for a test program. CM requirements are specified in the DCCR SOW. The Contractor is responsible for maintaining configuration control for the hardware and software under test. The CM process permits establishing and maintaining a baseline upon which to verify test results. By knowing the size and nature of software changes, the CM process can help determine when there is a need for retests or regression tests. During development and testing, the CM process can help maintain and track documented Program Trouble Reports (PTRs). See section 12.5 for further discussion of the DCCR CM process.

At the factory, the Contractor must document the configuration items being tested during software tests. During system integration, changes to the system are made and documented by the Contractor. These changes will affect not only the Contractor's test personnel during development of test procedures, but also FAA planning and conduct of early operational and technical evaluations, and development of test procedures. The CM process can help accomplish these tasks.

Test input data must likewise be controlled within the CM process. For example, any changes to scenarios used for simulating air traffic events or system inputs must be documented so that changes in expected results can be anticipated and correlated. Changes to test documentation must also be carefully controlled. Any deviations from the published test procedures must be identified and reported so that test results can be properly correlated. Control of technical documentation and user manuals is also important, especially for operational testing.

(Source: DCCR Draft TEMP, January 5, 1996, section 5.3.)

9.1.2.1 Factory Acceptance Test (FAT)

The DCCR development and testing started simultaneously at the Factory and at the FAATC. The new firmware and hardware are being developed by a subcontractor, and will be unit tested at the subcontractor's facility located in, Moorestown, New Jersey. Firmware will be unit tested by the subcontractor using a commercial debugging tool while the circuit card assemblies will be

tested using the power-on confidence tests developed for each custom board. Factory Acceptance testing will be conducted to ensure compliance with the subcontractor's Statement of Work. ACT-230, along with the primary Contractor, will monitor all of these test activities.

Factory testing at subcontractor's facility.

1. Display Controller firmware testing	1/96 - 3/96
2. DC/R-console Interface Module Factory Acceptance	4/96

9.1.2.2 Developmental Test and Evaluation (DT&E)

The DT&E Test Program, being conducted under the Prototype contract, ensures the planning and conduct of all tests necessary to show compliance with the DCCR System Specification. DT&E testing is being conducted at the FAATC by the Contractor from August 2, 1995 to September 28, 1996 with ACT-230 and AOS-300 monitoring the activities.

Software rehost development is being accomplished by the prime Contractor, at the FAATC. Initial software testing will be accomplished by the Contractor's code developers through unit and string tests, as the modules are developed at the FAATC. Representatives of the test organization will participate in the early software code reviews and testing to monitor the progress of the DCCR system including software changes made to the HOST Computer System.

As new and COTS equipment are installed at the FAATC laboratory, the prime Contractor conducts Installation and Integration (I&I) tests. Upon completion of the I&I testing, software build integration incrementally develops the final system. Once the system has matured to the point where all the software has been integrated, system testing will commence.

All tests will be witnessed by Government representatives. The Contractor will brief the Government representatives prior to starting any tests, and will only proceed with permission from the Government representatives. The Contractor conducts all tests, collects and analyzes data, and performs all required data reduction. Following completion of each test, the Contractor presents and discusses the results of the test with the Government representatives at a test de-briefing.

The Government Acceptance test of the DCCR at the FAATC at the end of DT&E testing consists of a continuous 72-hour operation demonstration of the complete system with the CCCH. The purpose of the demonstration is to ensure that the various equipment elements and subprograms successfully test on an individual and will function as a complete display system under various combinations of inputs and outputs. During the acceptance test, a sufficient load will be put on the CCCH/DCCR system to simulate a real-time Air Traffic Control (ATC) environment.

FAATC Installation and Integration testing by the prime Contractor.

1. DCRP #1	3/95
2. DCRP #2	8/95
3. DC/RIM	5/96

Scheduled completion of FAATC DCRP Software Build testing by the prime Contractor.

1. Build 1	2/95
2. Build 2	8/95
3. Build 3	12/95
4. Build 4	3/96
5. Build 5	6/96

FAATC final tests by the prime Contractor.

1. System test	6/96 - 11/96
2. Acceptance test	11/96

9.1.2.3 Performance Acceptance Test and Evaluation (PAT&E)

PAT&E for the Chicago ARTCC currently scheduled from April 29, 1996 to May 2, 1996. PAT&E for the balance of the DCCR sites will occur one month apart. PAT&E testing will be conducted on equipment being developed for the DCCR program (e.g. the DC&S) at the Formation Company's facility prior to shipment to FAA sites. This testing will ensure that the equipment being deployed is equal to the production baseline and functioning properly prior to shipment. A subset of the tests utilized for First Article testing will be performed. Due to the parallel Prototype and Production contracts, production hardware will be available for the Design Verification Test (DVT), so a combined DVT/FAT will be conducted with production hardware, but under the Prototype contract.

COTS equipment will be tested in accordance to the manufacturer's quality control and testing procedures at the manufacturer's facility.

Site Acceptance testing will begin at the FAATC with system checkouts of the NAS software with site adaptation at the FAATC prior to deployment to the field site.

Installation and Integration will be the first test to be performed at the ARTCCs and will be similar to that conducted at the FAATC. Hardware tests utilizing diagnostics will be performed to ensure hardware is installed and cabled properly and functioning as required. Interface compatibility tests will verify the DCCR hardware is electrically compatible prior to connection to Government equipment at the site. The Government Furnished Property (GFP) test will ensure proper integration of the DCCR into the NAS.

Current deployment schedule has a two-month window from the completion of I&I testing at the site and the start of Contractor-conducted system testing. During this time, the DCCR equipment will be used for FAA training and familiarization.

Following completion of the Site Acceptance Test (SAT), Contractor Acceptance Inspection will be conducted and FAA Site Shakedown Testing will begin.

Site testing by prime Contractor follows:

1. First Site (Chicago ARTCC) I&I Testing	6/24/96 to 7/19/96
2. Last Site (New York City ARTCC) I&I Testing	10/22/96 to 11/15/96
3. First Site System Acceptance	8/9/96 to 10/16/96

9.2 Test and Evaluation (T&E) Schedule

The components of the DCCR test program and the integrated test schedule for these activities are shown in 9-1. (Source: DCCR Program Activities Schedule, Revision #29, February 9, 1996; APMT/APMNI telecon, March 6, 1996.)

TEST AND EVALUATION ACTIVITIES	START DATE	END DATE
DCCR Prototype Contract Award	9/15/94	
DCCR Production Contract Award (Letter)	8/28/95	
Critical Design Review	4/27/95	4/27/95
DT&E Monitoring	1/2/96	9/25/96
DC&S Factory Acceptance Tests	4/17/96	4/22/96
Software Integration Tests	2/26/96	3/06/96
Installation and Integration Tests	2/29/96	3/11/96
Formal System Tests	8/12/96	9/17/96
FAATC Acceptance Tests	9/18/96	9/25/96
Functional and Physical Configuration Audits (FCA/PCA)	9/26/96	10/15/96
OT&E	8/16/96	10/4/96
Early OT&E	8/12/96	8/15/96
Full OT&E Integration and Operational Testing	4/9/96	10/6/96
- OT&E Integration	8/9/96	8/11/96
- OT&E Operational	8/11/96	10/6/96
Shakedown	10/7/96	11/6/96
IOTRD/IOT&E	11/7/96	11/7/96
PAT&E (First Site)	4/29/96	5/2/96
Site Acceptance Tests	8/9/96	10/16/96
Note: Test Activity at the remaining four sites (ZFW, ZDC, ZOB & ZNY) will occur on a one month waterfall.		

Table 9-1 DCCR Test and Evaluation Schedule

9.3 T&E Responsibility Matrix

This section identifies individuals and organizations involved in the DCCR test program and briefly describes the roles and responsibilities of each. (Source: DCCR Draft TEMP, January 5, 1996, section 4.1.)

9.3.1 Government Test Organization

The En Route Integrated Product Team Test Working Group (ETWG) consists of upper management personnel from the following organizations: AUA-200, AUA-210, AUA-230, AUA-240, ACT-230, ATR-320, ALM-500, AOS-30, AOS-300, ATQ-3, ASD-140, ASU-240, ASU-350, and ANS-200. Associate ETWG members for the DCCR include the DCCR Product Lead, ACT-205; the DCCR Associate Program Manager for Test (APMT) from ACT-230; and the DCCR Prime Contractor, Loral Federal Systems. A DCCR Test Working Group (DTWG) has been established consisting of the DCCR Product Representatives from the organizations on the ETWG.

The DCCR Product Lead, ACT-205, has responsibility for the development and deployment of the DCCR. The APMT has been assigned from the En Route Branch (ACT-230) of the ATC Engineering and Test Division (ACT-200), which is located at the FAA Technical Center, Atlantic City International Airport, New Jersey. The APMT coordinates test activities with all FAA organizations and support contractors participating in DT&E, PAT&E, and OT&E activities. Therefore, while the DCCR Product Lead has the overall responsibility for the success of the DCCR program, the APMT has the specific responsibility for the success of the test program.

ACT-230 through its assigned DCCR test supervisor monitors and observes the Contractor's test program, and directs the FAA's technical and operational evaluations through system acceptance of the DCCR at the FAATC. ACT-230 develops and conducts the OT&E Integration and Operational testing program at the FAATC. FAA organizations representing the operational user community (e.g., ATR-320, ALM-500, AOS-300) assist ACT-230 in planning and participating in the OT&E Integration and Operational Testing and will form an Air Traffic Service (ATS) Test Team to plan and conduct Independent OT&E.

The Prime Contractor is responsible for development of a DT&E and PAT&E program to conform to the test requirements defined in the DCCR Engineering Requirement (ER) and Statement of Work.

Field site deployment and system testing are the responsibility of the Site Integration and Implementation Branch (AUA-230). Each site is responsible for developing and conducting its own test program following site acceptance. ACT-230 provides support to site T&E efforts, as will AOS-300, when requested.

The Office of Independent OT&E Oversight (ATQ) provides oversight of all development and test activities for the DCCR.

FAA personnel at the Technical Center, FAA Headquarters, Regions, and ARTCCs are involved in the T&E of the DCCR program as members of test teams. The teams review test-related documentation, witness tests, participate in OT&E, analyze test results and prepare test reports. Specific roles and responsibilities for FAA testing are furnished by FAA Order 1810.4B, "FAA NAS Test and Evaluation Policy". (Source: DCCR Draft TEMP, January 5, 1996, section 4.1.)

9.3.2 Contractor Test Organization

Contractor management of the DCCR Production Program will be accomplished by the Loral Federal Systems Air Traffic Control (LFS-ATC) DCCR management team at the FAATC. The

Loral DCCR Program Manager has overall responsibility for the planning, scheduling, implementation, controlling, analyzing, and reporting of all Proof of Concept and Production and Deployment contract tasks, as well as serving as the primary interface to the FAA with full responsibility and authority for managing the program to achieve cost, schedule, and technical performance requirements. The Loral DCCR Program Manager's organization includes a Deployment Manager and an Engineering and Support Manager, both residing at the FAATC. The Deployment department performs the training, deployment coordination, and site test activities for the Production and Deployment program. The Engineering and Support department performs the engineering and support tasks, as well as the test activities at the FAATC for the Proof of Concept Program. These departments are supported by the disciplines of Configuration Management, Problem Management and Quality Assurance.

Direction of test activities is provided by the Loral Test Management Team. The Test Management Team ensures that all schedules and milestones are met without sacrificing the quality of the system. The Test Lead is responsible for test planning, coordination and conduct. The Test Lead is involved from the start of the Production and Deployment test planning. Test Teams will be assigned for testing at each site. Each team consists of a team technical lead and members who conduct the testing at each of the ARTCCs. The Test Lead ensures all activities are performed with no impact to Air Traffic Control services, serves as the single point of contact for all test activities and ensures all of the members of the test team are prepared for deployment and all required products are completed on schedule. (Source: Loral DCCR Production and Deployment Technical Proposal, Final Draft, FAA-DCCR-P-/D-001, October 31, 1995, paragraphs 2.1, 2.1.1 and 5.6)

9.4 T&E Field Support Requirements

9.4.1 Personnel Requirements

Prime Contractor personnel, FAA Technical Center and associated support Contractor personnel, field support personnel, and operational personnel from the field will support risk reduction activities, system integration, DT&E, and OT&E as appropriate. Table 9-2 contains estimates of personnel required for each test activity in terms of number of people and total staff months. The personnel numbers represent average participation, and specific tests or test areas may require more or less personnel. The staff months were based on an estimate of how many personnel from a given organization would be needed for each activity and how long they would be needed. For example, a single field AT individual may be needed periodically for up to 6 months during the 12 month OT&E preparation period for a total of 6 staff months; this is indicated as part-time. Similarly, it is estimated that one lab manager and support staff will be needed from ACT-400 during DT&E & OT&E. Detailed staffing requirements will be arranged with each organization and will appear in individual test plans. During DT&E and PAT&E, Prime Contractor personnel will be the test developers and test conductors, while FAA personnel from ACT-230 and AOS-300 will monitor the test activities.

For OT&E and Field Shakedown activities, FAA personnel will be the test planners, conductors, and participants, and Prime Contractor personnel will support the testing as required. ACT-230 will direct OT&E Integration and Operational Testing. ACT-400 will support DT&E and OT&E testing through managing the lab facilities. AOS-300 will monitor DCCR OT&E Integration and Operational Testing. The ATS Test Team consisting of ATQ, AT, AF and AOS representatives

will plan and conduct Independent OT&E as well as support OT&E Operational Testing. Site estimates for OT&E include personnel to support test preparation and to serve as test participants and expert observers. While ACT-230 test personnel will require some skills enhancement to transition from the HOST DCC/CDC environment to the DCCR, due to the similarities between the two systems no formal training is planned for ACT-230 Government or support personnel.

Each team member will be experienced in scenario and adaptation preparation and test tool operation. Each member of the team will be experienced in DR&A procedures in order to evaluate system performance. Field Personnel supporting OT&E and IOT&E/Shakedown will require training in familiarization with new equipment and functional capabilities are needed in order to conduct hands-on tests. FAATC test organization and associated support Contractor personnel, field support, and operational personnel from the field will support the development test program. (Source: DCCR Draft TEMP, January 5, 1996, section 4.5.1.)

Table 9-2 DCCR Test Personnel Staffing Requirements

Test Activity (Months)	Resource Estimates (Personnel/Staff Months)								
	Loral	FAA							
		ACT-230*	ACT-400	AOS-30	AOS-300	ATQ-3	Sites		
							AT	AF	AOS
Factory Testing (Loral) (4)	10/40	5/20			2/8	0/0			
FAATC Integration & Test (Loral)(12)	6/72	7/84			3/36	0/0			
DCCR OT&E I&O Testing (FAA) - Preparation (15) - Training & Test Conduct (4) - Test Reporting (1)	# 3/6	4/60 4/16 4/4	# 3/22 # 3/6	# 1/7 # 1/2	2/30 3/12	# 1/2	# 1/7 # 5/10 1/1	# 1/7 5/20 1/1	# 1/7 5/20 1/1
DCCR Independent OT&E (FAA) (Shakedown) - Preparation (4) - Training & Test Conduct (1) - Test Reporting (1)	0 0		# 3/6 # 3/3	2/8 3/3 2/2	4/16 4/4 2/2	1/4 1/1 1/1	# 3/6 5/5 1/1	# 4/8 5/5 1/1	# 1/2 5/5 1/1
Site Testing (Loral) Each Site (3)	5/15	3/9			1/3		2/6	3/9	2/6
Field Shakedown Test (FAA) - Preparation (12) - Test Conduct (2) - Test Reporting (1)	# 1/6 2/4	# 1/6 1/2			1/6 1/2		# 2/12 6/12 1/1	#4/24 6/12 1/1	# 2/12 4/8 1/1

Table 9-2 (Cont.) DCCR Test Personnel Staffing Requirements

Legend:
* Includes FAA support Contractor personnel.

# Indicates part-time (50%) participation

9.4.2 Test Equipment Requirements

The following test equipment is required at each site and will be provided by the FAATC for use in on-site testing by the DCCR Contractor.

1. Channel Decoder
2. Character Decoder (2)
3. Electronic Counter, Systron Donner 7014
4. Printer, Systron Donner 5103
5. Textronic Type 453 Oscilloscope
6. Textronic Type 115 Pulse Generator
7. Photographic support for test validation

(Source: DCCR Draft TEMP, January 5, 1996, section 4.5.4.)

9.4.3 System Access

ACT-230's requirements for access to site equipment for conduct of testing is summarized below, including access schedule and projected duration. (Source: APMT E-Mail, Site.DOC, 1/29/96.)

9.4.3.1 Access for Site Installation and Integration Testing

After the DCCR equipment has been installed and diagnostics successfully executed to ensure the equipment is functioning properly, integration testing with the existing government equipment (HOST, DG/RKM, and PVD's) will be performed.

9.4.3.1.1 Access for Host-DCRP Integration Testing

The expected duration of this test is 12 hours, comprised of three four-hour test runs. This test will require exclusive use of both Host processors, so continuing air traffic operations will have to be conducted in a DARC-only mode. This test is planned to be conducted from 12:00 AM to 4:00 AM.

9.4.3.1.2 Access for PVD-RIM Switch-DG/RKM Integration Testing

The expected duration of this test is 30 hours, comprised of 60 (number of PVDs at site) 1/2 hour test runs. This test is planned to be conducted from 12:00 AM to 4:00 AM. During each 1/2 hour test run, exclusive use of that individual PVD is required. The first set of PVD's to be transitioned through the RIM Switch will be those that are normally non-operational during the mid-shift, as determined by site personnel. These PVD's will be transitioned and tested, approximately five per shift, until all the PVDs in that set have been tested. Note: In order to transition and test the remaining PVDs, approximately 15 mid-shift air traffic controllers will have to be moved to different PVD's; i.e., those that have already been transitioned to the RIM Switch so that all PVD's at the ARTCC can be transitioned, integrated, and tested with the DCCR System.

9.4.3.2 Access for DCCR System and Acceptance Testing

The expected duration of this test is 160 Hours, comprised of 40 four-hour test runs, planned to be conducted over a two month period. An average of 20 hours/week of Host computer time is

required; eight hours/week with air traffic operations being conducted in DARC only mode, and 12 hours/week with air traffic operations being conducted in DARC/FDP mode.

9.4.4 Space Requirements

The following facility space is required to support testing requirements:

1. Space for two file cabinets (size 18" x 42 "" x 65") to store DCCR system.
2. Office space, 15 ft x 15 ft.
3. Multiple Virtual Storage (MVS) and Virtual Memory (VM) disc space and user-id.

(Source: APMT E-Mail, Site1.DOC, 1/29/96)

9.5 T&E Program Status

9.5.1 Test Results Summary

To date no production tests have been completed. (Source: APMT, March 12, 1996.)

9.5.2 Outstanding Program Trouble Reports (PTR)

The number of open PTRs will vary throughout the DCCR test process. Each PTR will be classified within one of the five categories listed below and addressed within the PTR resolution process as provided in paragraph 9.5.3. However, at the start of FAATC Test Readiness Review, no Emergency or Test Critical PTRs will be open. The five categories of PTRs are:

1. Emergency Priority. Prevents an operational or mission essential capability or jeopardizes operational safety.
2. Test Critical Priority. Restricts or adversely affects an operational or mission essential capability and a workaround is not available.
3. High Priority. Restricts or adversely affects an operational or mission essential capability and a workaround is available.
4. Medium Priority. Prevents, restricts or adversely affects a non-essential capability and can be handled procedurally.
5. Low Priority. All other Baseline system problems.

(Source: APMT/APMNI telecon, March 13, 1996.)

9.5.3 Discrepancy Correction Process

Any deficiency in a test article discovered during a test will be reported in detail in a PTR. The source or suspected source of the problem, impact on other tests (criticality of the problem), test identification, and any other data required to reproduce the problem will be submitted. Each problem will be reported on a separate form in accordance with quality assurance procedures and classified in one of the above PTR categories.

The PTR resolution process is composed of the following steps:

1. The PTR is officially entered into the Problem Management System (INFO).
2. System Engineering/Software Development screens the PTR for technical content and then assigns it to the appropriate department for resolution.
3. Problem is corrected, regression testing performed as required to verify correction has not impacted other areas.

4. The Formal Baseline maintained by configuration management is updated and PTR originator formally closes the problem.

(Reference: DCCR Draft TEMP, January 5, 1996, section 4.4.1.5; DCCR Configuration Management Plan, CDRL P030.)

9.6-9.19 (Reserved)

9.20 Status Assessment

The DCCR Test and Evaluation Master Plan was submitted to the TPRC for approval at the March 29, 1996 meeting. Approval of the TEMP is necessary before testing can be successfully completed.

10.0 SYSTEM SUPPORT

10.1 Life-Cycle Management/Disposition Plan

The DCCR is an interim system, currently planned for installation only at the five DCC sites; no upgrades to this system are planned. The performance of the DCCR system will be monitored by the FAA through information collected and reported by the Contractor. The Contractor will track all failure data to include: failure analysis; date/time of failure; model number; type of failure; actual repair time; maintenance action required; time to respond; and down time. The Contractor will track repairs made on each LRU and provide a report to the FAA, showing the MTBFs and usage by part number. (Source: DCCR SOW, December 18, 1995, section 3.5.1.1.1.)

10.2 Hardware Engineering Support Concept

The maintenance concept for the DCCR hardware and software includes both Contractor and FAA maintenance support. The system, both hardware and software, will be maintained by a Contractor for five months following CAI at each of the DCCR sites. After the initial five month period of Contractor maintenance at each site, the FAA will perform the DCCR maintenance for the remainder of the system's life cycle. Second level maintenance support to the FAATC/AOS will be provided by a Contractor for a period of one year following CAI at the first site. Following the initial year of Contractor support, second level maintenance support for DCCR will be provided by the FAATC/AOS for the remainder of the system's life cycle. The DCCR maintenance concept for both hardware and software is depicted in Table 10-1. (Source: Draft DCCR ILSP, February 21, 1996, Chapter 3.)

LOCATION	HARDWARE	SOFTWARE
Five DCC Sites	Contractor on-site five months following CAI, eight hours/day, seven days/week, with two hour call back. After fifth month, FAA maintains with two, three month options.	Contractor on-site five months following CAI, eight hours/day, five days/week. After fifth month, FAA maintains with two, three month options.
FAATC, ACT-410	Contractor on-site five months following CAI, eight hours/day, five days/week, with two hour call back.	
FAATC, AOS-300	Two labor years for one year, with one year option.	Two labor years for one year, with one year option.

Table 10-1 DCCR Maintenance Concept

10.2.1 Field Operations Organizations

FAA NOMs will be trained to localize and isolate system faults. Their responsibility is then to notify an FAA technician for the removal/replacement of the LRU or part and verification of the corrective maintenance action. Even during the Contractor maintenance period of the contract,

the FAA will perform certification activities, and corrective maintenance will always be controlled by FAA personnel. For second level maintenance, AOS has the responsibility of ensuring the site is operational. Once operational, AOS will perform analysis to determine the cause of the failure. (Source: Draft DCCR ILSP, February 21, 1996, Chapter 3.)

10.2.2 Field Engineering Organizations

Engineering support is provided by AOS, located at the FAATC, when local ARTCC expertise and resources cannot solve the problem or excessive time has expired at the ARTCC. AOS may provide on-site support as required. (Source: Draft DCCR ILSP, February 21, 1996, Chapter 3.)

10.2.3 FAA Logistics Center

See section 10.4.

10.2.4 NAS Operations Support (AOS)

NAS Operations Support is responsible for providing direct hardware engineering support to fielded DCCRs and for directive publication and issuance. AOS-300 supports the sites in system-wide problems, develops and evaluates equipment modifications, and provides a higher level of assistance to solve difficult NAS problems. (Source: Draft DCCR ILSP, February 21, 1996, section 2.2.3.)

10.2.5 Contractor Maintenance

Starting at CAI and continuing for five months at each site, the Contractor will:

1. Respond to faults Perform all LRU remove and replacement activities, verify corrective maintenance actions, and obtain FAA certification. In all cases the FAA will conduct system/service/element level certification of the DCCR after maintenance actions. The Contractor will coordinate all maintenance actions with the respective on-site representatives.
2. Establish procedures approved by the FAA to record and track all failure data to include: failure analysis; date/time of failure; model number; type of failure; actual repair time; maintenance action required; time to respond; and down time. The Contractor will provide this data to the FAA after each maintenance action. Using this information, the Contractor will track repairs made on each LRU and provide a report to the FAA, including all DCCR sites and the FAATC, showing the MTBFs and usage by part number.

The Contractor may use form, fit, function replacements for failed units which meet the following minimum requirements:

1. All aspects of functionality remain unchanged.
2. Form, fit and function are transparent to the system architecture.
3. Form and fit change within the constraints of a function.

(Source: DCCR SOW, December 18, 1995, section 3.5.1.1.1.)

10.2.6 Other Special Support Organizations

There are no special facilities which will support products of the DCCR program following deployment.

10.3 Software Engineering Support Concept

As discussed in paragraph 10.2 above, the Contractor is responsible for software maintenance for the first five months after CAI. Software maintenance will be conducted on two levels, with first level maintenance consisting of those maintenance actions performed at the ARTCC and second level maintenance actions performed at the FAATC. At the ARTCC, first level maintenance actions involve local adaptation data, problem identification and isolation, software downloading and testing, and cutover of new software releases. All other software maintenance actions will be the responsibility of the second level maintenance organization (AOS-300) at the FAATC. Other than required for on-site maintenance, interaction with vendors will be accomplished by the second level maintenance organization. Refer to Table 10-1. (Source: Draft DCCR ILSP, February 21, 1996, section 3.5.4.)

10.3.1 Field Operations Organizations

The FAA will identify software problems by receiving alerts or errors at the RIOT position, or by visual observation or manual interaction with the system. Once a problem is detected, the FAA will perform problem localization and isolation and any other procedures required for preliminary problem analysis. Once the problem is identified or if further problem analysis at the site is required, the AF POC at the ARTCC will contact Contractor maintenance personnel. (Source: Draft DCCR ILSP, February 21, 1996, section 3.5.4.1.)

10.3.2 Field Engineering Organizations

AOS-300 is responsible for providing direct software engineering support to fielded DCCRs and for directive publication and issuance. It supports the sites in system-wide problems, develops and maintains software, and provides a higher level of assistance to solve difficult NAS problems. See section 10.3 for further details on software maintenance. (Source: Draft DCCR ILSP, February 21, 1996, section 2.2.3.)

10.3.3 FAA Logistics Center

See section 10.4.

10.3.4 NAS Operations Support (AOS)

The AOS organization at the FAATC is the focal point for DCCR software maintenance. Software maintenance conducted at the FAATC consists of collecting and analyzing problem data received from the sites, identifying the problem and generating a modification to fix the problem, testing the modification, building a software release for the sites, and distributing the release. The DCCR support system will have the capability of distributing new software versions and related documentation to operational sites following testing and verification. This support system also will have the configuration management tools to manage the distributed software versions. Software maintenance activities at the FAATC ensure the initial release and subsequent updates to DCCR software do not detract from the operational functions or current operational functions. (Source: Draft DCCR ILSP, February 21, 1996, section 3.5.4.)

10.3.5 Contractor Maintenance

The Contractor will furnish software support services for all items supplied under the contract, including CAS and developed software. Following are the software support services to be performed:

1. Assist the NOM by helping to monitor and analyze system errors and performance;
2. Provide system problem determination and resolution assistance;
3. Report/document problems and track through resolution;
4. Recommend corrective actions to maximize system performance;
5. Develop and recommend system maintenance improvements;
6. Organize/prepare all elements of program documentation including the library;
7. Develop and document procedures and operating methods;
8. Ensure integrity of all data or documentation received, processed or produced using site configuration management procedures;
9. Assist with installation, integration and testing of any updates to operational software, CAS, software tools, and associated products;
10. Coordinate receipt of new releases of software;
11. Assist with all aspects of adaptation changes;
12. Coordinate site mimic with FAATC technical staff;
13. Develop test plans, procedures, and data bases; conduct and analyze tests;
14. Confirm testing has been completed satisfactorily, fallback systems are in place, and the new system is properly documented.

For second level engineering support, the Contractor will update the DCCR software product and operational baselines when directed by the government. The Contractor will update the software baseline to incorporate changes resulting from changes in requirements, specifications, external interfaces, and problem resolution. The Contractor will design, develop, integrate, test, document and distribute changes to the DCCR software product baseline.

(Source: DCCR SOW, December 18, 1995, pages 9 and 10.)

10.3.6 Other Special Support Facilities

No software support facilities other than those described above are required for DCCR.

10.4 Materiel Support

10.4.1 Provisioning and Supply Support

Supply support for the DCCR will be provided by a Contractor from equipment delivery at each site until five months after CAI. Thereafter, supply support will be provided by the FAA. Formal provisioning documentation is not required for the production and deployment of DCCR.

During the contract support period, the Contractor may stock repair parts at the ARTCC site in the space provided. (See section 6.8.) Repair parts are under the exclusive control of the Contractor. Failed parts that have been replaced by the maintenance Contractor become the property of the Contractor and will be removed from FAA premises to preclude inadvertent reintroduction of failed items into the DCCR. A failed part diagnosed "no trouble found" will not be reintroduced into the FAA system unless the FAA has certified the part for reuse. The Contractor will provide a 90 day supply of spare and repair parts on site or in depot reserve to ensure that the 99% spares availability is achieved.

At the conclusion of the Contractor support period, the FAA will assume supply support responsibility for the sites and the FAATC. The FAA will purchase two years of spares and repair parts for the DC&S to ensure that 99.9 spares availability is maintained. Spares and repair parts for the DC&S will be replenished as required throughout the system's life cycle. To provide life cycle supply support for the DCRP, the FAA will purchase spares and repair parts for the DCRP directly from the equipment manufacturer (IBM) on an as needed basis. A same day delivery service is available, as well as a 24 hour Airborne Express Service. Failed repairable items will be returned to IBM for repair and/or replacement. (Source: Draft DCCR ILSP, February 21, 1996, section 4.1.)

10.4.1.1 Depot Supply Support

Depot supply support for DCCR will be provided through Contractor Depot Logistics Support (CDLS). CDLS will begin at the conclusion of the contractor on-site maintenance and supply support period and continue for a period of nineteen months. Under CDLS, on-site maintenance is provided by FAA technicians, and depot supply support is provided by the Contractor. The FAA site technicians deal directly with the FAA Logistics Center (FAALC), which manages CDLS, and the FAALC deals directly with the Contractor for exchange and replacement of LRUs. The initial lay-in of spares at each site is based on a Contractor recommended and FAA approved spare parts list. The recommended spare parts list will be based on failure rate analysis, with a confidence level of 99% that a spare will be available when needed.

10.4.2 Packaging, Handling, Transportation and Storage (PHT&S)

The Contractor will provide all PHT&S requirements in accordance with best commercial practices. While under Contractor maintenance, all PHT&S for hardware, software, and firmware is the responsibility of the Contractor. Electrostatic Discharge (ESD) procedures will be used when handling circuit card assemblies or cables. Items packed for shipment to another location will be packed so they will not be damaged in transit. Each shipped container will be clearly marked so identification is possible without unpacking. It will also contain a packing list providing quantities and a detailed description. (Source: Draft DCCR ILSP, February 21, 1996, section 9.0.)

10.5 Technical Documentation

A complete set of hardware and software technical manuals that document the installation, use, operation, recommended certification procedures, and maintenance of the DCCR will be provided by the Contractor. This set of manuals will consist of Contractor developed and commercially available manuals. Updates to level three design data documentation and support software user manuals will be provided to the FAA by the Contractor. (Source: DCCR SOW, December 18,1995, section 3.5.5.)

10.5.1 Hardware Documentation

The Contractor will provide draft operations and maintenance technical manuals to the FAA for approval as detailed below. The content and format of the DCCR developed hardware technical manuals and all COTS hardware manuals will be in accordance with FAA-D-2494B. The content and format of all developed system maintenance related manuals that do not lend themselves to FAA-D-2494B will be as agreed to by the FAA. (DCCR SOW, December 18, 1995 section 3.5.5; Draft DCCR ILSP, February 21, 1996, section 10.2.)

10.5.1.1 Manufacturer's Hardware Manuals

The Contractor will deliver manufacturer's hardware documentation for all hardware. This documentation will meet the intent of FAA-D-2494, Appendix 1.

10.5.1.2 DCCR Operator Manual

The Contractor will prepare and submit for Government approval, a DCCR Operator Manual to provide the user with instructions sufficient to operate DCCR. In-progress reviews of the Operator Manual will be conducted by the Government per FAA-D-2494. The reviews will be conducted at the Contractor's facility at 30%, 60%, and 90% draft manual completion or as deemed necessary by the Government. The Contractor will provide drawings, illustrations, and support materials to assist in manual review. Comments from the review will be incorporated into the draft manuscript prior to its submission as a deliverable item.

The Contractor will validate all operator and maintenance procedures. The Contractor will develop a Validation Plan in accordance with FAA-D-2494 for review and approval by the Government. The approved plan will be binding as the basis for manual validation. The Government will have the option of witnessing the validation and/or combining the validation and verification efforts.

10.5.1.3 Hardware Technical Manuals

The Contractor will prepare and submit for Government approval, DCCR Hardware Technical manuals for any developmental hardware, detailing operational, maintenance, installation and support instructions.

10.5.1.4 Maintenance and Support Manuals

As required and specifically addressing DCCR, the Contractor will prepare the following manuals:

1. FAATC/ARTCC/FAA Academy System Maintenance and Support Manuals;
2. Common Support Tools and Equipment User Manual;
3. FAATC/ARTCC/FAA Academy System Management Manuals;
4. System Overview Manual.

10.5.1.5 Engineering Drawings

The Contractor will provide engineering drawings in accordance with the CDRL.

10.5.2 Software Documentation

The Contractor will deliver manufacturer's software documentation for all software. This documentation will meet the intent of FAA-D-2494, Appendix 1. The content and format of all CAS manuals and all developed software related manuals that do not lend themselves to FAA-D-2494B will be as agreed to by the FAA.

For software oriented manuals, where the content requirements of FAA-D-2494B are inappropriate, the content will, at a minimum, include the following type of information:

- Hardware/Software Diagnostic Support
- System level problem determination and correction

- Fault isolation to a level consistent with the maintenance concept
- Data gathering activities
- Logs, analysis, and reporting
- Unit/System Verification & Certification
- Use of DCCR system to conduct maintenance
- Logon/off
- Use of tools and test equipment in maintenance
- Initialization and operation of computer equipment and software
- Remove and replace, loading, burn-in, and verification procedures of firmware devices
- Computer Human Interface (CHI) and operation of DCCR equipment from controller and supervisory perspective
- Instructions for use of software and database maintenance tools
- Modifying software source code
- Adaptation data
- Managing, administrating, monitoring, controlling, and scheduling of system hardware and software resources
- Support software messages
- Overview of functions and capabilities of the DCCR system

(Source: Draft DCCR ILSP, January 12, 1996, section 10.3.)

10.5.2.1 Software User's Manual (SUM)

The Contractor will develop a SUM document specifically for the DCCR. The manual will clearly indicate the relationship to all other program documentation and describe the function of all developed and undeveloped software. The SUM will describe the new coding, as well as modifications required for compatibility between NAS and DCCR. The Contractor will issue changes to reflect different DCCR configurations as each baseline is defined. This manual will provide an overview of DCCR software maintenance activities and will contain a complete set of instructions for the use of software and database maintenance tools.

In-progress reviews of the Software User's Manual will be conducted by the Government per FAA-D-2494. The reviews will be conducted at the Contractor's facility at 30%, 60%, and 90% draft manual completion or as deemed necessary by the Government. The Contractor will provide drawings, illustrations, and support materials to assist in manual review. Comments from the review will be incorporated into the draft manuscript prior to its submission as a deliverable item.

The Contractor will validate all operator and maintenance procedures. The Contractor will develop a Validation Plan in accordance with FAA-D-2494 for review and approval by the Government. The approved plan will be binding as the basis for manual validation. The Government will have the option of witnessing the validation and/or combining the validation and verification efforts.

10.5.3 Procedural Documentation

Included in the set of technical manuals provided to the FAA by the Contractor are use, operation, maintenance and recommended certification procedures manuals. See hardware and software sections above for validation and verification procedures.

In preparation for the Government taking responsibility for DCCR maintenance following the first five months after CAI at each operational DCCR site, the Contractor will prepare a Contractor Support Transition Plan for approval by the Government. This plan will detail the activities that the Contractor will undertake to ensure a smooth transition of the system from Contractor support to support by the Government. The plan will address the preparations, facilities and personnel requirements and recommend the time required to ensure a smooth transition with minimal interruption to maintenance activities. (Source: DCCR SOW, December 18, 1995, section 3.5.5.)

10.6 Support Equipment

The Contractor will identify and provide all special test and support equipment used to perform remove and replace maintenance tasks at the ARTCCs and the FAATC. For the support equipment required to support operation and maintenance of DCCR equipment, the Contractor will provide technical data that may include procedures, reports, instructions, manuals, drawings, and specifications.

One portable maintenance terminal (NEC Versa V/50) per site is required for trouble shooting and software down load to FAATC and will be provided by the contractor. (Source: Draft DCCR ILSP, February 21, 1996, section 5.0; APMT/APMNI telecon March 13, 1996.)

10.7-10.19 (Reserved)

10.20 Status Assessment

There are no system support issues known at this time that have the potential to impact the implementation of the DCCR program.

11.0 PROGRAM SCHEDULE INFORMATION

11.1 Program Master Schedule

Table 11-1 provides a schedule of major events in the DCCR program. The JAI and equipment removal dates shown are based on the projected ORD dates. Although equipment delivery dates have been accelerated six months from the original schedule, the corresponding ORD dates have not changed. (Source: En Route IPT; DCCR program Activities Schedules, Revision # 29, February 9, 1996.)

Program Implementation Milestones	Actual/Projected Schedule
KDP-1	February 27, 1992
KDP-2	July 2, 1992
KDP-3	July 26, 1995
KDP-4	July 26, 1995
DRR EXCOM	November 30, 1996
First Site Equipment Delivery	June 7, 1996
First Site ORD	December 31, 1996
Last Site Equipment Delivery	October 4, 1996
Last Site ORD	June 4, 1997
Last Site Equipment Removal/Project Close-out	July 7, 1997

Table 11-1 DCCR Program Master Schedule

11.2 Equipment Delivery Schedule

Table 11.2 provides the deployment schedule for DCCR. Current equipment delivery schedules can be obtained through query of the Master Delivery Forecast Module (MDFM) or contacting the DCCR APMNI. (DCCR program Activities Schedule, Revision #29, February 9, 1996.)

Deployment Site	Projected Equipment Delivery Schedule
Chicago ARTCC (ZAU)	June 7, 1996
Fort Worth ARTCC (ZFW)	July 5, 1996
Washington ARTCC (ZDC)	August 12, 1996
Cleveland ARTCC (ZOB)	September 6, 1996
New York ARTCC (ZNY)	October 4, 1996

Table 11-2 DCCR Equipment Delivery Schedule

11.3 Site Implementation Schedule

Table 11-3 lists the seven phases of implementation and provides the estimated start and completion of each phase, relative to equipment delivery. The GSIP in Appendix A provides further detail of activities necessary during the seven phase of implementation associated with the

DCCR program. An overview of program activities, from early planning through equipment removal, is depicted in figure 11-1. (Source: En Route IPT.)

Site Implementation Phase	Estimated Start (days +/- equipment) delivery)	Estimated Completion (days +/- equipment delivery)
Implementation Planning	-365	+120
Pre-INCO	-270	0
INCO	0	+90
Site Integration	+90	+120
Site Shakedown	+120	+180
Dual Operations	N/A	N/A
Equipment removal	+210	+270

Table 11-3 DCCR Site Implementation Schedule

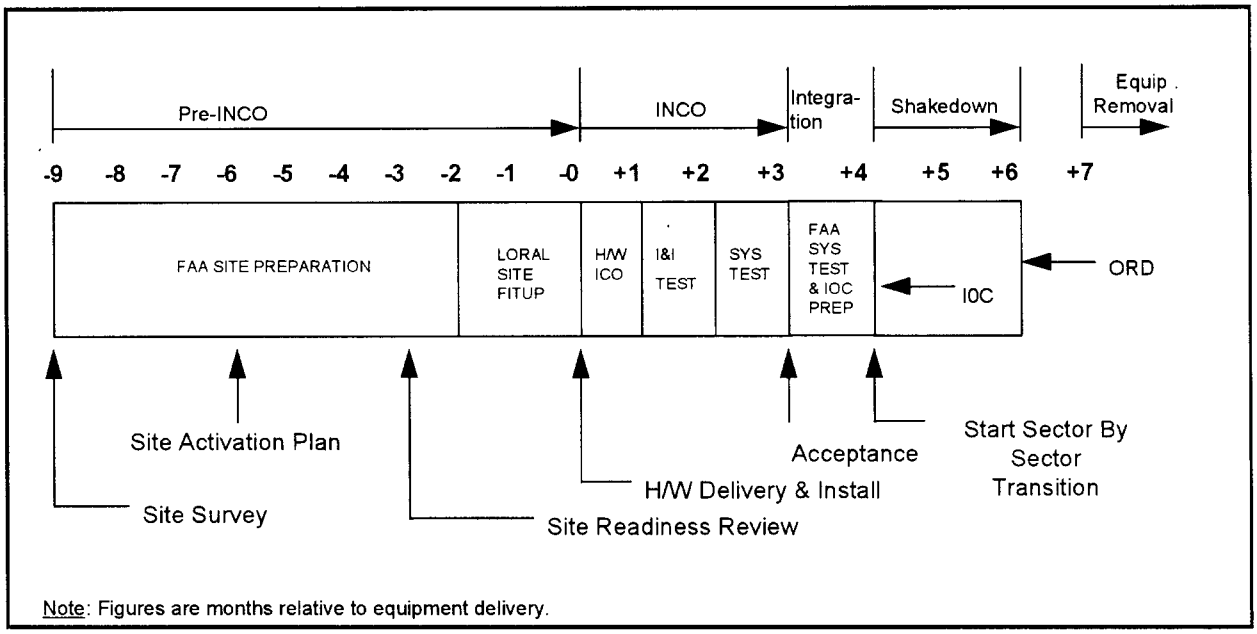

Figure 11-1 DCCR Program Activities

11.4 Schedule Dependencies

There are no known schedule dependencies with the DCCR program.

11.5-11.19 (Reserved)

11.20 Status Assessment

There is no missing or incomplete schedule information with the potential to impact DCCR site implementation.

12.0 ADMINISTRATION

12.1 Acquisition Summary

12.1.1 Market Survey

Because of the urgency of the DCCR acquisition, no market survey was required. (Source: DCCR Program Office, January 5,1996.)

12.1.2 Acquisition Strategy

The acquisition strategy for the DCCR program has two phases: Prototype and Production. The prototype phase provides for building one DCCR system and testing that system at the FAA Technical Center as a proof-of-concept acquisition. This phase was intended as an insurance program to ensure that there would be a replacement system that could be fielded in a timely manner, should there be delays in the DSR program, prior to the display systems at field sites reaching critical limits.

In the production phase, five sites will receive DCCR for installation, testing and eventual operational status.

The program schedule is currently baselined to reflect the first site Operational Readiness Demonstration to occur in October 1997. However, all parties involved in the DCCR effort are striving toward an earlier schedule, improving tasks in some areas and eliminating those tasks that are not essential to the deployment of this short-term interim program. By striving toward an earlier schedule, some flexibility is available to allow for any program/funding delays. (Source: DCCR Program Office, January 5, 1996.)

12.2 Contracting Information

The Prototype phase was contracted as a task order under the HOST contract, DTFA01-85-C-0030, being performed by Loral Federal Systems, in order to save time in contracting activities. The Production phase is currently being negotiated as a sole source contract, DTFA01-95-C-00042, to Loral Federal Systems. Definitization of this contract is expected by April 1996. (Source: DCCR Program Office, February 22, 1996.)

12.2.1 Prime Contract

The Prime Contractor for DCCR is:

Loral Federal Systems, Domestic Air Traffic Control
9211 Corporate Boulevard
Rockville, MD 20850

The subcontractors are:

Computer Sciences Corporation
4061 Powder Mill Road
Calverton, MD 20705

Formation, Inc.
121 Whittendale Drive
Moorestown, NJ 08057

Norm Guice Associates
507 Seaspray Road
Ocean City, NJ 08226

Technical & Management Assistance, Inc.
P.O. Box 808
Absecon, NJ 0820112.2.2

(Source: DCCR Program Office, January 5, 1996.)

12.2.2 Service Contracts

There are no service contracts associated with the DCCR program. (Source: DCCR Program Office, January 5, 1996.)

12.2.3 Program Support Contracts

The four Contractors providing support to the DCCR Program Office are listed below. (Lockheed Martin provides support through the NISC Contract and TRW through the AUA-TAC Contract.) They are expected to continue their support throughout the implementation of the DCCR program.

RMS Technologies
5 Eves Drive
Marlton NJ 08053

Atlantic Sciences and Technology Corp.
1413 Cantillion Blvd.
Suite 200
Mays Landing, NJ 08330

Lockheed Martin
1280 Maryland Ave., SW
Suite 580
Washington, DC 20024

TRW
600 Maryland Ave.
Suite 607
Washington, DC 20024

(Source: DCCR Program Office, January 5, 1996.)

12.2.4 Regional Contracting

There are no regional contracts in effect to support DCCR, although some local contracting is anticipated for site preparation efforts. (Source: DCCR Program Office, January 5, 1996.)

12.2.5 Government Furnished Property/Information/Equipment (GFP) (GFI) (GFE)

The extent of GFE/GFI/GFP obligations are still to be determined based on the negotiations of the DCCR Production contract, to be definitized in April 1996.

12.3 Program Management (PM)

12.3.1 Product Team Organization

The members of the DCCR Product Team are shown in Table 12-1. (Source: DCCR Program Office, January 5, 1996.)

NAME	ORG	TITLE	PHONE NUMBER
Peter Challan	AUA-200	En Route Integrated Product Leader	(202) 376-6538
Ann Tedford	AUA-200	Deputy En Route Integrated Product Leader	(202) 376-6545
Perry Copp	ACT-205	DCCR Product Lead/Technical Officer	(609) 485-4775
Gary Jones	ACT-205	System Engineering/Alternate Technical Officer	(609) 485-4852
Joanne Cecchetti	ASU-350	DCCR Contracting Officer	(202) 376-6895
Jim Hanrahan	ALM-500	DCCR Associate Program Manager for Logistics (APML)	(202) 267-3162
Scott Stemple	ACT-230	DCCR Associate Program Manager for Test (APMT)	(609) 485-6942
John Cormack	AUA-230	FAA Implementation Lead	(202) 376-6524
Jim Falls	ANS-210/ NISC	DCCR Associate Program Manager for NAS Implementation (APMNI)	(202) 651-3077
Steve Norbrey	ALM-500	AF Representative	(202) 267-3288
Jill Casaccio	AOS-350	AF Representative	(609) 485-5710
Mike Gough	ATR-320	AT Representative	(202) 267-7750

Table 12-1 DCCR Product Team Organization

12.3.2 Program Status Reporting

DCCR program status is reported monthly to the En Route Integrated Product Team Lead, AUA-200. This status contains technical, schedule, cost and financial assessments, including any setbacks the program may be experiencing and what corrective action is being taken. All corrective actions are tracked to completion within the DCCR program office. This information is consolidated into a monthly Oversight Report which is given to AUA-1, ARA-1 and eventually the FAA Administrator. This information is also included in a report provided to Congress that gives a succinct snapshot of all programs currently in the Office of Air Traffic Systems Development. (Source: DCCR Program Office, January 5, 1996.)

12.3.3 Issues Identification, Tracking and Resolution

All issues and action items associated with the DCCR program are contained in an Action Item database, maintained by Loral Federal Systems. This database contains a brief description of the action item, the responsible individual, a suspense date, and current status. Meetings are conducted weekly between the FAA and Loral Federal Systems to discuss these action items and their current status. All action items are tracked to closure using this process. (Source: DCCR Program Office, January 5, 1996.)

12.4 Quality Assurance

Quality Assurance provisions are still to be determined based on the negotiations of the DCCR Production contract, anticipated to be definitized April 1996. (DCCR Program Office, February 22, 1996.)

12.4.1 Program Acceptance Criteria

Contractor performance measures are still to be determined based on the negotiations of the DCCR Production contract, anticipated to be definitized April 1996. (DCCR Program Office, February 22, 1996.)

12.4.2 Risk Management

Risk management is implemented by the entire DCCR team. The process is integrated into the team's day-to-day activities via access to risk management information, review of risks and actions at regular meetings, and checkpoints for evaluating risk-related activities. Anyone on the DCCR team may identify a candidate risk for consideration, and everyone is actively and continually encouraged to do so, and non-attribution is advocated.

The Product Lead will:

- Establish the risk management approach
- Identify functional areas and leads;
- Approve risk reduction measures to be included in the product planning;
- Establish a risk management team to facilitate the implementation of the risk management process;
- Approve terminology and criteria for classifying the probability of risk occurrence and the severity of potential impact;
- Assign the risks to functional area leads or specialty area points of contact.

Each DCCR functional area lead is responsible for:

- Identifying and documenting candidate risks;
- Assessing the probability and severity of the potential consequences via approved assessment criteria;
- Communicating candidate risks surfaced through reviews at specific milestones and throughout the product life cycle;
- Determining the appropriate strategy to handle the risk;

- Ensuring that a set of alternatives are developed to mitigate the risk and to regain the target critical path (the alternatives will be independently evaluated and analyzed);
- Reviewing solutions for impact to other product areas and other programs;
- Developing a plan of action;
- Assessing and reporting progress;
- Ensuring the plan of action is accomplished.

Issues which are considered risks are communicated throughout the risk management team. The candidate risks will normally be worked within the integrated product team structure.

A technical staff is dedicated to facilitate the risk management process. They arrange review and approval of the risk assessment criteria, arrange and conduct Technical Interchange Meetings (TIMs) to assess program risk, and develop the checklists to be used at each risk management milestone. They also perform independent risk analysis and alternative analyses when appropriate and review program goals documented in the Program Management Plan with the DCCR Program Plans. As the organization matures, program control practices will be continually reviewed and enhanced. This process will continue so that the strategy to brief risks may be optimized and highly responsive. It is expected that risks will be briefed on a regular periodic basis, such as weekly, monthly or quarterly, and be coordinated with program level risk management personnel to provide information for overall schedule risk and cost risk. All risks are documented in a Risk Management Plan. The DCCR Risk Management Plan also describes the mechanisms that will be used to continue to surface and address risks during the project life cycle. FAA Order 1810.1F, paragraph 4-19 and the FAA-P-1810, ACQ-1 0494 Interim Acquisition Risk Management Guidance, dated June 14, 1994, and approved for use by GAO, were used in the development of this plan. (Source: DCCR Risk Management Plan, September 29, 1995, Chapter 2; DCCR Program Office, January 5, 1996.)

12.5 Configuration Management (CM)

The configuration management team for DCCR, co-located with the product team in ACT-230 at the FAATC, is empowered by the En Route IPT to manage the configuration identification, configuration control, configuration status accounting, and configuration audits for the new hardware and software components. (Source: ACT-200 cc:mail, March 15, 1996.)

12.5.1 CM Responsibilities

AUA-200 is responsible for ensuring appropriate CM of DCCR from development until retirement. The authority for planning and implementing this responsibility, including coordination with or transition to other FAA departments, is entrusted to the DCCR Product Team Lead (PTL). The ACT-200 Program Control Officer will act as the DCCR Configuration Management Officer (CMO). The ACT-200 Program Control Officer will develop and distribute the DCCR Configuration Management Implementation Plan (CMIP) to describe the necessary CM approaches and procedures. Loral, as prime contractor, will establish, implement, and maintain, a CM program on all DCCR hardware and software items in accordance with MIL-STD-973.

The functional, allocated, and design baselines for DCCR were established during the preceding prototype development project and contract. This baseline was carried forward into the current development program. The DCCR CMO is responsible, on behalf of the PTL, for management and change control of the baseline and its documentation until completion of formal test and successful Functional Configuration Audit (FCA) and Physical Configuration Audit (PCA) which will define the product baseline. The DCCR CMO will plan and provide for the maintenance and integrity of this baseline until transition of the responsibility for the implementation and support of the system.

12.5.2 Configuration Control Boards (CCBs)

The En Route Configuration Control Board (CCB) has CCB responsibility for the DCCR component of the En Route system. The DCCR PTL is delegated authority to act for the chairman when appropriate in accordance with the En Route CCB Charter. Change control will be performed as detailed in the Charter and Operating Procedures.

12.5.3 CM Milestones

FCA	10/15/96
PCA	10/15/96

12.5.4 Configuration Items (CI)

The DCCR system consists of two subsystems: the DCRP subsystem, which includes the RIOT, and the DC&S subsystem.

12.6-12.19 (Reserved)

12.20 Status Assessment

All information that is unavailable due to Production Contract negotiations will be incorporated following definitization of the contract in April 1996. Resolution of these items during negotiations are not expected to affect the timely deployment of DCCR.

13.0 IMPLEMENTATION (REQUIREMENTS)

13.1 Implementation Support Organization

13.1.1 Associate Program Manager for NAS Implementation (APMNI)

ANS-210 has assigned Jim Falls, (202) 651-3077, as the APMNI to support the En Route Automation Integrated Product Team Leader. The APMNI is a member of the En Route Automation IPT and is responsible to the DCCR Product Lead for coordinating the development of the DCCR Program Implementation Plan, coordinating and tracking implementation and transition issues through the Transition Information Exchange process, participating in DCCR implementation team activities, and reviewing Contractor developed implementation plans, procedures and reports, as required. (Source: IPG, June 1994, page 13.)

13.1.2 Field Level Involvement

Field input from Airway Facilities and Air Traffic personnel for the DCCR program implementation strategy is coordinated through the DCCR RAPM to ensure both regional and site awareness. The on-site coordinator for en route automation at each ARTCC generally is the point of contact who coordinates individual site inputs. Specific input was obtained during DCCR implementation team visits to each deployment site following a decision to accelerate the delivery schedule. During these visits regional and site personnel were briefed on the program and preliminary site surveys were conducted. The information gained during these visits was beneficial in preparation for the Contractor site surveys. The development of the DCCR GSIP was initiated by the APMNI through the lead region, Great Lakes (AGL) RAPM and coordinated with the lead site, Chicago ARTCC, on-site coordinator. (Source: DCCR Implementation Team.)

13.1.3 Regional Associate Program Manager (RAPM)

Each region has assigned an RAPM as the Headquarters interface to the DCCR program. The RAPMs represent Airway Facilities field divisions with matters of program status, cost, schedule, and performance. They coordinate with the field and other regional offices on technical and operational matters that may impact the DCCR program and ensure regional reviews and responses to FAA Headquarters and DCCR Contractor documents are accomplished. RAPMs are responsible for the regional review of the PIP/GSIP, and the development of any Site Implementation Plans. The APMNI coordinates with RAPMs as a single point of contact for DCCR matters to identify and resolve DCCR implementation issues and concerns. Table 13-1 provides a list of the RAPMs for the DCCR program. (Source: ANS-210.)

Region	Name/Office Symbol	Telephone No.
Great Lakes (AGL)	Bernie Woolridge AGL-459.1	(847) 294-7677
Southwest (ASW)	Russell Lenz, ASW- 421.1	(817) 222- 4222
Eastern (AEA)	Jim McGovern, AEA-453.1	(718) 553- 3467

Table 13-1 DCCR Regional Associate Program Managers

13.1.4 Technical On-Site Representatives (TOR) and Regional Engineers (RE)

Technical On-site Representatives (TOR) are appointed by the Regions to represent the government contracting officer and, generally, are Airway Facilities personnel. They are the point of contact for all Contractor on-site activities and will coordinate those activities with local and regional AF and AT personnel. The TOR will oversee Contractor delivery, installation, training, and testing efforts at the DCCR receiving site. No Regional Engineers (RE) have been identified for the DCCR program. DCCR site TORs have not been designated to date. When TORs are identified, the information for Table 13-2 will be provided to the RAPMs. (Source: ACT-205, March 15, 1996.)

Site	Name/Office Symbol	Telephone No.
Chicago (ZAU)		
Fort Worth (ZFW)		
Washington (ZDC)		
Cleveland (ZOB)		
New York (ZNY)		

Table 13-2 DCCR Technical On-Site Representatives

13.1.5 Contract Support

In addition to the DCCR Contractor personnel, contract support for site implementation is provided by NISC and AUA-TAC personnel. NISC personnel are located at Headquarters, Regional Offices and at each ARTCC. They will provide administrative and advisory assistance to the regions and sites throughout the implementation process, as assigned, from planning through equipment removal. SETA personnel will provide technical assistance to the DCCR implementation team, as directed. (Source: AUA-230.)

13.2 Site Implementation Process

Site implementation activities focus on the identification of changes or new requirements in physical, functional or performance capabilities, resulting from the installation of the DCCR. The following subparagraphs describe the implementation requirements and activities associated with each site implementation phase. Appendix A provides specific activities associated with each phase of implementation.

13.2.1 Implementation Planning Phase

Planning begins with the approval of the MNS and extends through the system integration phase. (Source: IPG, June 1994, page 17.)

13.2.1.1 Implementation Activities

Planning activities requiring field participation include identifying individual site implementation requirements; assisting in the development of the DCCR PIP and GSIP and developing individual SIPs (to include tracking the progress of fulfilling the requirements of these tools); participating, as necessary, in various Contractor activities; and providing review/comment on implementation documents, as required.

13.2.1.2 Implementation Requirements

The field plays an important role in the planning activities for DCCR implementation, including review and comment on various planning documents. Additionally, DCCR implementation team personnel coordinate with Regional and designated site personnel to ensure adequate resources will be available and that appropriate site preparation activities have been accomplished.

13.2.2 Pre-Installation and Checkout (Pre-INCO) Phase

This phase consists of all site preparation tasks necessary for equipment delivery and installation. Pre-INCO begins with the program site survey and concludes with the delivery of equipment at the site. (Source: IPG, June 1994, page 19.)

13.2.2.1 Implementation Activities

Pre-INCO activities include necessary planning, site survey, site fit-up and preparation for and delivery of equipment. The Contractor is responsible for conducting the site survey, fit-up, and equipment delivery. Specific FAA regional and site AF and AT personnel will assist as required, and their responsibilities identified during the planning process. All of these activities will be coordinated with the host site manager and the contracting officer.

The Contractor will provide general planning for the DCCR installation and site acceptance. Site Installation Integration Plans will be developed by the Contractor and submitted for FAA approval. The Site Installation Integration Plans will document in detail all tasks to be performed for the installation of the DCCR at the various sites. The FAA will provide the site-specific data during the site survey at each site.

The Contractor will perform all tasks and planning necessary to prepare for specific site installation. This will include visiting each site and collecting all site information required to physically deploy and operate the system.

The Contractor will be responsible for conducting site surveys for each receiving site and will visit each site to obtain current, accurate, and complete site survey information. The Contractor will prepare and submit for FAA approval a Site Survey Report detailing results of the site survey and installation plans for each individual receiving site. The FAA will provide the Contractor the data requested in the site survey four calendar months prior to installation, and the Contractor will review all data received to verify that the FAA provided all the required information. In the event that the Contractor detects any omission or invalid information, the Contractor will contact the organization that prepared the site survey to obtain the correct information. The Contractor will prepare and submit for FAA approval a Site Survey Report detailing results of the site survey and installation plans for each individual receiving site. In addition, the Contractor will prepare the following documents relating to DCCR site preparation:

1. Site Preparation Package.
2. Site Readiness Review Report.

The Contractor will furnish site installation drawings for each site. Any conflict between FAA and the Contractor requirements will be resolved and approved by the FAA prior to equipment installation. These drawings will define, as a minimum, detailed size descriptions of the

equipment, installation geometry, clearance requirements, cable entry/exit locations, locations of peripheral equipment (i.e., printers, recorders, etc.). and associated cable/data links, locations of equipment already in place and schematics and/or wiring diagrams not provided in other technical documents.

The Contractor will develop and submit for FAA approval the Site Acceptance Test Plan and Site Acceptance Test procedures. The Site Acceptance Test Plan/Procedures will document the criteria/procedures for acceptance of the DCCR.

13.2.2.2 Requirements

Site specific requirements for Contractor fit-up will be identified during individual site surveys. No additional AT personnel will be required during this period, and no requirement for additional AF personnel is anticipated. Funding necessary for FAA site personnel to accomplish any site preparation identified during a site survey will be provided to the appropriate Region by the DCCR program office.

13.2.3 Installation and Checkout (INCO) Phase

The INCO phase includes all activities associated with the installation of program equipment and the testing of the system's stand-alone functionality. This phase begins after the delivery of DCCR equipment at the site and continues through successful completion of equipment testing in the stand-alone mode. The milestone marking the end of this phase normally is the conclusion of the Contractor Acceptance Inspection. (Source: IPG, June 1994, page 19.)

13.2.3.1 Implementation Activities

Installation and Checkout activities begin following equipment delivery. These activities include, but are not limited to:

1. Placement of the system components;
2. Mechanical installation;
3. Electrical Installation;
4. System Operational Test;
5. Removal and disposal of all packing material;
6. All local site permits;
7. Site Acceptance Test
8. Contractor Acceptance Inspection.

All material, equipment, and tools required for proper Contractor installation of the DCCR will be provided by the Contractor. The Contractor will be fully responsible for the transport and off-loading of all installation material and equipment, without damage or loss, to the installation site and the Government-designated installation area within the site building. The Government will not be responsible for storage of DCCR for any period of time between transport and placement. Government personnel will not assist in this activity except to clear aisles and areas to allow for the intra-facility movement of the DCCR system components to their installation positions.

The Contractor will notify, in writing, at least 30 calendar days prior to an installation, the following FAA personnel: the FAA host site manager, the FAA contracting officer, the FAA SI&I Lead (AUA-230), and the regional coordinator. Three business days before the installation,

the Contractor will reconfirm the installation by calling these established points of contact. If the FAA wishes to postpone installation, it must provide notice via telephone, to the Contractor as soon as possible, but no later than three business days prior to the scheduled installation date. All required permits and licenses will be acquired by the Contractor prior to the three-day reconfirmation of installation. The Contractor will arrange for the disposition of all packaging and other disposable materials.

The Contractor will be responsible for all the mechanical/physical and electrical installation of the DCCR system. This will include connection of the system components to the site power and grounding system, and placement of intra-component cabling. The Contractor will supply all cabling, wiring, connectors (including surge protection), terminators and associated hardware, and will conduct all required inspections.

Sites at which installation, integration, or testing activities are being conducted may have on-going ATC functions. The Contractor will minimize any interfere with these functions. The Installation and Integration Plan will determine scheduling, contract manpower, and equipment requirements which may impact the ATC functions. The Contractor will make adequate provisions in the personnel staffing and installation/testing procedures to allow for a flexible utilization of Contractor on-site personnel to avoid conflicts with ATC activities at the site. Every effort will be made to permit as much installation work to proceed on the prime shift, but no absolute assurance can be given that this will always be possible. The Contractor will be required to perform installations during other than prime shifts as the mission requirements dictate.

All wiring, materials and procedures used for and during installation and testing will be in conformance with the local code and the National Electrical Safety Code. In the event of conflict, the local code will take precedence. Plenum-rated cables will be used. All installation materials will be Underwriter's Laboratory approved without excluding conditions.

13.2.3.2 Requirements

Implementation activity requirements are provided in the GSIP (Appendix A). Site specific activities will be outlined in individual Site Implementation Plans. To assist in completion of a facility's CAI, personnel from that site are encouraged to participate in a previous site's CAI. No additional AT personnel will be required during this period, and no requirement for additional AF personnel is anticipated.

13.2.4 System Integration Phase

The System Integration Phase extends from completion of the CAI through FAA declaration of IOC for the system. (Source: IPG, June 1994, page 19.)

13.2.4.1 Implementation Activities

IOC is declared when equipment hardware and software installation and testing have been completed and meet defined requirements. IOC is the declaration by AT and AF managers, in concert with responsible FAA headquarters and regional personnel, that the DCCR (including hardware, software, procedures, and personnel) is physically and functionally capable of being certified and of replacing the current AT system. Upon declaration of IOC, a Facilities Master File (FMF) change is implemented by site personnel to transfer DCCR from a preconstruction to a test/operational mode. Equipment element failures of any DCCR equipment are entered into the

National Airspace Performance Reporting System (NAPRS) for failure mode tracking. The declaration of IOC also serves as a milestone in the facility integration of the system

13.2.4.2 Requirements

The following are required to be accomplished prior to declaration of IOC:

1. NAS operational software has been validated;
2. Operations and maintenance training for the DCCR have been completed;
3. Procedures have been established and validated for switching to DCCR;
4. ARTCC AF personnel have received appropriate certification;
5. Facility personnel have established confidence in the ability of the DCCR to function safely and effectively in the ATC environment;
6. Current FAA-accepted final copies of all DCCR technical documentation have been delivered.

13.2.5 Field Shakedown Phase

The Field Shakedown Phase consists of the period between IOC and ORD. During this phase, the technical and operational forces and management personnel employ the DCCR in a carefully controlled operational environment to verify that the fully integrated system is functional. Use of the system will begin during low traffic time periods, gradually increasing for longer periods under full traffic conditions. During this period, the Contractor is in a support role. Since there will be no Dual Operations Phase with the implementation of DCCR, conclusion of the Field Shakedown Phase will include completion of a JAI. (Source: IPG, June 1994, page 19.)

13.2.5.1 Implementation Activities

This period of DCCR implementation demonstrates that the DCCR can be used effectively in the operational ATC environment and that ARTCC personnel can support these operations. The activities during this phase lead to the integrated readiness of personnel, procedures, and equipment in the operational use of the DCCR. Each facility is responsible for system shakedown of the DCCR at its site. Shakedown activities focus on the following specific areas:

1. Ensuring that facility personnel develop confidence in using the DCCR, learn the system's capabilities, and become proficient in diagnosing and repairing problems;
2. Evaluating operational and maintenance proficiency;
3. Evaluating training and providing additional or revised training if necessary;
4. Completing transition from the DCC to the DCCR.

Upon completion of full system cutover, a JAI is performed and ORD is declared. ORD is the formal declaration that the DCCR system meets all requirements for full operational use. System shakedown supports the determination by the JAI Board that the DCCR is ready for full operation and commissioning in the NAS.

13.2.5.2 Requirements

Transition from the DCC system to DCCR will be accomplished primarily during non-peak traffic hours to minimize the potential for disruption of ATC operations. The procedures for transition to the DCCR system are provided in the DCCR Transition Plan.

Before a new or improved facility or electronic equipment system is accepted for maintenance and operation as a commissioned facility in the NAS, a JAI is held on the system. This is the culmination of a series of activities detailed in the Facilities Reference Data File, FAA Order 6030.45. This includes an investigation and research of records, specific requirements and criteria, as well as the documentation of all inspections, tests, and demonstrations required to assure the FAA that the DCCR adequately meets all the operational, engineering, and maintenance requirements and is ready to be formally placed into operational use or service. This task is described in the following paragraphs:

The pre-JAI punch list is a management tool that identifies the discrepancies encountered during implementation activities. This list is maintained by the Regional NAS Implementation Branch. The list includes a description of problems and identifies corrective action to be taken by the FAA before final acceptance of the system by the FAA field organizations.

JAI is accomplished by formation of a board of management personnel knowledgeable about the project. The Airway Facilities representative designated by the System Management Office manager serves as the chairperson. Board members have full authority to determine conditions for facility/equipment/system acceptance and to sign the JAI report for their respective offices. The board is composed of, but not limited to, representatives from the Airway Facilities and Air Traffic organizations.

The members of the JAI Board determine, within their individual program areas, if facility, system, or equipment operation is satisfactory to provide its required service. The ultimate determination that the facility is ready to be commissioned for service is dependent upon the technical performance of the equipment and the attainment of the required operational service. As a part of the JAI, an operational readiness demonstration is declared.

The ORD is the formal declaration that the system meets requirements for full operational use. System performance, maintainability, training, spare parts availability, and documentation are among the many items examined during the ORD. A final JAI is conducted by AT and AF managers. ORD is the declaration that the following tasks have been accomplished:

1. Refinement of operating procedures, methods, adaptation, and parameters;
2. Adequacy demonstration;
3. Verification that system, subsystem, software, and equipment documentation is accurate;
4. Verification that sufficient staffing exists and that personnel are sufficiently trained and familiar with system functions and equipment.

Commissioning is the formal exercise of incorporating the DCCR into the NAS. The determination that the DCCR is commissioned for service is dependent upon the technical performance of the system and the attainment of the required operational service. The requirements for commissioning the DCCR are as follows:

1. The JAI Board determines the conditions of acceptability in accordance with established standards and signs the JAI report for their respective offices;

2. The Facility Reference Data File is established, to include all applicable NAS Change Proposal and Configuration Control Document (CCD) technical reference data documentation and reference materials;
3. A change to the Facility Master File is initiated to place the facility in a commissioned status.

13.2.6 Dual Operations Phase

There is no Dual Operations Phase with the implementation of the DCCR program. Following ORD of the DCCR at a facility, the replaced system (i.e., DCC/CDC) will not be used for ATC operations, unless required as a fallback.

13.2.6.1 Implementation Activities

Not applicable.

13.2.6.2 Requirements

Not applicable.

13.2.7 Equipment Removal Phase

13.2.7.1 Implementation Activities

After operational transition to DCCR, the old DCC/CDC equipment will be retained for a minimum of 30 days, for use as a fallback to the old system if necessary. The removal date of the old equipment is decided by the JAI Board for each site. Also accomplished during this phase is the removal of implementation support and test equipment, the restoral of the facility to operating condition, and the final update of the FAA F&E databases to reflect the new configuration.

13.2.7.2 Requirements

Procedures and responsibilities for the removal and disposal of replaced equipment will be provided for in the Disposal Plan, scheduled for completion by ALM-500 in May 1996. Funding for these requirements and for the restoration of each facility will be provided to the appropriate regions by the DCCR program office.

13.3 Unique Implementation Sites

Not applicable. The DCCR system deployed to the FAATC was a prototype system installed under a separate contract. (Source: En Route IPT.)

13.4-13.19 Reserved)

13.20 Status Assessment

Areas requiring completion or resolution include:

1. Completion of site preparation activities by each DCCR site, as identified during site surveys, are necessary prior to Contractor site fit-up.
2. The certification requirements for the DCCR system and the accompanying impact on AF procedures need to be determined before ORD at the first site.

3. The Disposal Plan for the DCCR must be completed to ensure the proper removal and disposal of the replaced equipment. The plan was provided to the regions and sites for comment in January 1996. Approval is expected in May 1996.
4. A national contract for the removal of equipment to be replaced by the DCCR system must be initiated. However, this has no impact on the implementation of DCCR.
5. The DCCR program office has identified an area of concern for the initial powering-up of the system within the ARTCCs. The DCCR elements and RIM switch must be installed before DCCR functional testing can begin. Once the switches (RIM and PMCS) are installed, live operational data must flow through them to the operational DCC or EDARC for on-line ATC operations or through DCCR for ATC testing operations. For this to happen, the DCCR elements and peripherals must be installed on the critical power system because all equipment directly used for ATC operations must be on the critical power bus. However, in complying with this requirement, there is conflict with FAA Order 6950.15B, ARTCC Critical Lead Circuits and Configuration, which defines requirements for integration of new equipment into the NAS. This order states in paragraph 5.c. that:

"All new critical systems/equipment shall first be tested by the test Power Conditioning System serving critical power center D (CPC) distribution panel (DP) until it is assured that the new systems/equipment are compatible with existing critical power systems and have passed the operation readiness demonstration test."

The DCCR program office has initiated a request to ANS-220 for waiver of FAA Order 6950.15B. In this waiver, the program office provided an analysis and recommendation for a proposed DCCR Power-On Procedure that represents a variation, but which complies with the intent of the above order. Approval of this waiver is expected and is necessary for the implementation of DCCR.
6. Identification of a TOR for each DCCR site is in process.

APPENDIX A - GENERIC SITE IMPLEMENTATION PLAN (GSIP)

GSIP Content: The GSIP has been developed as a tool to assist regional and site personnel with development of site specific implementation plans. Regional and site personnel can tailor this activity list to fit their specific needs and avoid developing each Site Implementation Plan from scratch. The GSIP consists of a broad list of activities required to install a project at a facility, organized by each phase of the implementation process. The following project resource table can be used as a starting point to identify those activities required to successfully complete a project implementation at a specific location. The activities are organized by project implementation phase: Planning; Pre-INCO; INCO; Integration; Field Shakedown; Dual Operations (not applicable with DCCR); and Equipment Removal. This table also includes entries for resource estimates related to each task such as, responsible organization, time to complete, etc. Since facilities may differ, certain activities may not apply and should be removed from the list. Other activities may need to be added to the list in order to complete the specific site's implementation effort. The purpose of this GSIP is to provide sites with a generic plan which can be tailored to their specific needs.

Act. #	Activity	Duration	Respons. Org / Indiv	Due Date/ Schedule	Comments	PIP PARA REF
	PLANNING PHASE					
1	Identify the following for the region:	1 day	AUA-230	Cont. award	RAPM disseminate; ongoing.	11.2 / 11.3
	Installation sites					
	Site survey dates					
	Site fit-up					
	Equipment Delivery date(s)					
	Equipment Installation date(s)					
2	Identify Regional and Site responsibilities for DCCR Implementation	5 days	AUA-230	30 days > cont. award		Chapter 13
3	Develop cost estimates for site prep	30 days	RAPM	15 mos. < equip. del.	Prior to coordinating funding PA	13.1
4	Coordinate funding PA for DCCR advanced planning and engineering with ACT-205	45 days	RAPM	12 mos < equip. del.	Relocation of non-DCCR equipment and support equipment. (F&E support)	13.2
5	Identify DCCR Implementation Team, including AF and AT Test Directors	2 days	NASOC	90 days < Site Survey	Coordinate with Region and Site AF and AT management	9.4; 13
6	Publish Site Survey Plan	10 days	NASOC / ACT-205	60 days < Site Survey		13.2
7	Develop a plan to track action items and issues	1 day	NASOC	< Site Survey		13.2
8	Identify site survey personnel:	2days	RAPM	< Site Survey		13.2
	Site AT participant(s)					
	Site AF participant(s)					
	Site Contractor support participant(s)					
	Technical Onsite Representatives (TOR) & phone number					13.1.4
	Safety / HAZMAT participant					
	Regional 4XX participants					
	Regional 5XX participants					
	Regional Logistics Coordinator					
	FAA Headquarters observer / participants					
9	Identify site AF support personnel budget requirements for implementation	5 days	RAPM / NASOC	< Site Survey		7.2.1
10	Identify site AT support personnel budget requirements for implementation	5 days	AXX-510 / AMNI	< Site Survey		7.2

Act. #	Activity	Duration	Respons. Org / Indiv	Due Date/ Schedule	Comments	PIP PARA REF
11	Identify site access and badging requirements for delivery and testing personnel	1 day	NASOC	< Site Survey	Ongoing / as required	8.1
12	Develop labor estimates for DCCR site preparation and travel costs	2 days	RAPM	Site Survey	Requires Program Office designation of Region/Site responsibilities.	7.2
13	Initiate Implementation & Information (I&I) Brief with PASS and NATCA	10 days	NCO	Site Survey	Ongoing coordination	8.1.1.6
14	Identify unique space requirements for installation	2 days	NASOC	Site survey		13.2.1
	Equipment storage					
	Staging dock area requirements					
	Spares storage					
	Test equipment storage					
15	Identify impacts of other projects on DCCR implementation	1 day	NASOC	Site Survey	List schedules and resources (example DSR). Coordinate with AUA-200	5.1.2/11.4
16	Determine if sufficient floor space is available for installation. If not, generate local NCP for an alternate location.	2 days	NASOC	Site survey		6.8.2
17	Identify additional requirements or space impacts based on DCCR equipment installations, e.g.:	5 days	RAPM	Site survey	Joint effort among RAPM, AXX-450, NASOC and SMO	13.2
	Additional ceiling, wall, & floor penetrations					
	Additional power and circuit breaker requirements					
	Building modifications/HVAC					
18	Coordinate Maintenance Training Course Requirements with AFZ-100	3 days	RAPM	Site Survey	Number of people per implementation phase	8.3
19	Publish first draft of Site Implementation Plan	30 days	NASOC	60 days > Site Survey		1.1; 13.2
20	Identify and update local AF changes to:	45 days	SMO / NASOC	< IOC	AOS to provide Maintenance Handbook and complete nat'l action	3.2; 10.1
	Procedures and standards					
	Admin. and maintenance procedures					
	Operational procedures					
	Interfacility procedures					
	System backup and cutover procedures					
	Certification Procedures					
21	Develop Transition Plan	20 days	NASOC	IOC	Coordinate with AF and AT	4.2.7;13.2

Act. #	Activity	Duration	Respons. Org / Indiv	Due Date/ Schedule	Comments	PIP PARA REF
	PRE-INCO PHASE					
22	Conduct Initial FAA site survey to update site drawings and complete site survey worksheets	3 days	AUA-230	10-12 mos < equip. del.		13.2.2.1
23	Certify with AUA-200 advanced funding PA is in place	5 days	RAPM	10-12 mos < equip. del.		7.2
24	Update F&E cost estimates and schedules for DCCR site prep	2 days	RAPM	10 mos < equip. del.		13.2.1
25	Update estimates for travel costs associated with DCCR prep	2 days	RAPM	10 mos < equip. del.		13.2.1
26	Review updated site drawings and documents with the DCCR contractor:	5 days	NASOC	Site Survey		6.9
	Floor plan layouts					
	Facility blueprints					
	Grounding / bonding locations					
	Shielding requirements					
27	Provide Contractor point of contact list	1 day	NASOC	Site Survey	Coordinate with AT and AF	13.1
	AF Coordinator					
	AT Site Coordinators					
	Sector & Site Coordinators for testing					
	Site Security P.O.C.					
	Site Technical On-site Representative (TOR)					
	Alternate TOR (ATOR)					
28	Confirm shipping address and phone number with Program Office (AUA-200)	1 day	RAPM	Site Survey		11.2
29	Identify support space for:	2 days	NASOC	Site Survey		13.2.3.1
	Test personnel					9.4.4
	Delivery Contractor personnel					
	Staging and assembly area					
30	Review equipment layouts for:	2 days	NASOC	Site Survey	Coordinate with AF	6.8; 13.2
	Backroom equipment					
	Impact of delivery on operation of adjacent equipment					
	New furniture requirements					
	Minimum access requirements - front, back, sides, top					
	Rack requirements and locations					
	Rack admin power requirements					

Act. #	Activity	Duration	Respons. Org / Indiv	Due Date/ Schedule	Comments	PIP PARA REF
31	Determine support equipment and access requirements:	3 days	NASOC	Site Survey		13.2
	Availability of ramps					
	Elevator sizes and capacities					
	Door openings					
	Stair well sizes					
	Staging area, ladders					
	Dollies / fork lifts					
	Trash removal / recycling					
32	Review DCCR power requirements:	5 days	NASOC	Site Survey	Coordinate with SMO	6.4
	Essential / Critical					
	Power panel access					
	Circuit breaker access					
	Testing procedures					
	Cut-over procedures					
33	Identify required cabling mods:	5 days	NASOC	Site Survey		6.3
	Convenience power outlets for contractor work					
	Wall, ceiling & floor penetrations					
	Circuit breaker panels affected					
	Unique drilling requirements					
	Grounding, bonding, and shielding requirements					
34	Identify DCCR Contractor P.O.C. for delivery activities	1 day	AUA-230	Site Survey		12.2
35	Review HAZMAT requirements	5 days	NASOC	Site Survey	Coordinate with AXX-460, AFS, SMO, TOR and Contractor	6.6
	Asbestos					
	Dust					
	Noise					
	Storage					
	Usage					
	Removal					
	Disposal					
	Lock-out/Tag-out					
	Identify FAA HAZMAT / Environmental coordinator				AXX-460 takes lead	
	Obtain asbestos permits if required				Contractor responsibility	
36	Review Contractor's Site Survey Quick Look Report	20 days	NASOC	60 days > Site Survey		13.2.2
37	Initiate Facilities Reference Data File (FRDF) for DCCR	5 days	AXX-450	< delivery	Coordinate with NASOC	13.2.4
38	Finalize training course attendees and schedule for:	10 days	NASOC	6 mos < equip. del.	Coordinate with SMO, FAAC and AOS-350	8.3
	DCCR Orientation course					

Act. #	Activity	Duration	Respons. Org / Indiv	Due Date/ Schedule	Comments	PIP PARA REF
	AF Hardware Maintenance					
	Engineering Support Services				FAAC & AOS-240 Personnel	
39	Delivery, storage & equipment access:	2 days	NASOC	2 wks < equip. del.	Coordinate at Site Readiness Review	10.3.3
	Arrange access to point of delivery					
	Arrange for equipment storage					
	Arrange for equipment off load					
40	Develop Site Readiness Review agenda:	5 days	RAPM	30 days < equip. del.	Coordinate with AF and AT	13.2.1
	Security passes/badges					
	Parking					
	Number and type of vehicles					
	Transfer, loading, and unloading requirements					
	Contractor clearance list with SSNs etc.					
	Work day					
	In house contact list					
	Training schedule					
	Issue resolution & tracking					
	Verify contractor insurance coverage & bonding					
41	Identify any LOAs and MOAs required or needing modification	5 days	RAPM/AXX-510	30 days < equip. del.		13.1.3
42	Review and approve Contractor site acceptance test plans and procedures	30 days	NASOC / ACT	< equip. del.	Coordinate	13.2.3
43	Develop CAI Plan	30 days	AUA-200	< equip. del.		13.2.3
44	Review Test Plans:	45 days	NASOC	< CAI	Coordinate with RAPM	9.1
	OT&E/Integration test plan					
	OT&E/Operational test plan					
	OT&E Shakedown					
45	Identify testing personnel	5 days	NASOC	< CAI	Coordinate with SMO and ATM	9.4
46	Coordinate CAI Plan with SMO & site personnel	20 days	NASOC	< CAI		13.2.4
47	Develop Field Shakedown testing plan	45 days	NASOC	< CAI	Plan covers activity from CAI to ORD	9.1.1

Act. #	Activity	Duration	Respons. Org / Indiv	Due Date/ Schedule	Comments	PIP PARA REF
48	Participate in previous sites' OT&E/Integration testing (as required)	5 days	RAPM	CAI	Coordinate with SMO	13.2.3
	INCO PHASE					
49	Establish the JAI Board (JAB)	5 days	SMO	< JAI	Chaired by AF SMO representative	13.2.5
50	Update cost estimate for AF and AT personnel providing project specific support	5 days	RAPM	Continuous		7.2
51	Oversee hardware delivery in "Stand Alone" configuration	1 day	AXX-450	During delivery	Coordinate with RE/TOR	13.2.3
52	Update AF system certification procedures	20 days	AOS-300	CAI		3.2
53	Conduct the Contractor Acceptance Inspection (CAI)	5 days	ACT-205	CAI	Coordinate with NASOC and SMO	13.2.3
54	Update AF personnel certifications for new equipment	10 days	SMO	< IOC		3.2.6
55	Update facility maintenance operating procedures for project hardware	10 days	SMO	< IOC	Coordinate with NASOC	3.1.2
56	Complete facility electronic site preparation	14 days	AXX-450	IOC	Includes relocation of non-DCCR equipment	13.2.3
57	Determine disposition of replaced equipment	10 days	SMO	< equipment		13.2.7
58	Finalize FRDF	10 days	SMO	Commissioning	Coordinate with NASOC	13.2.3
	SYSTEM INTEGRATION PHASE					
59	Update cost estimate for AF and AT personnel providing project specific support	2 days	RAPM	Ongoing		7.2
60	Complete AF training	90 days	RAPM	< IOC		8.3
61	Review AF operational procedures	30 days	NASOC	IOC		3.2 ; 4.2
62	Close out any outstanding CAI discrepancies.	30 days	NASOC	IOC		13.2.4
63	Conduct operational testing	30 days	SMO / AT	IOC		9.1.1
64	Monitor Field Shakedown testing	60 days	AOS/AUA/ACT	IOC		9.1.1
65	Conduct AF familiarization training	10 days	SMO	IOC		8.3
66	Declare Initial Operating Capability (IOC)	1 day	SMO / ATM	IOC	Coordinate with NASOC	13.2.4

Act. #	Activity	Duration	Respons. Org / Indiv	Due Date/ Schedule	Comments	PIP PARA REF
67	Prepare final testing report	10 days	NASOC	90 days > IOC		13.2.5
	FIELD SHAKEDOWN PHASE					
68	Review funding requirements to complete Field Shakedown Phase tasks	2 days	RAPM	Ongoing		7.2
69	Identify funding requirements to complete Dual OPS and Equip. Removal Phase tasks.	5 days	RAPM	6 mos. < ORD		7.2
70	Validate operational procedures	30 days	SMO / ATM	ORD		13.2.5
71	Monitor Field Shakedown	60 days	AOS/AUA/ACT	ORD		13.2.5
72	Conduct Joint Acceptance Inspection (JAI) using the JAI checklist	1 day	SMO	ORD	Coordinate with NASOC & AT	13.2.5
73	Conduct Commissioning procedures	1 day	SMO	ORD		13.2.5
74	Monitor and report on system performance	90 days	SMO / ATM	At decomm.		13.2.5
	DUAL OPS PHASE (Not Applicable)					
	EQUIPMENT REMOVAL					
75	Remove the replaced equipment	30 days	AXX-450	> decomm		13.2.7

APPENDIX B - TRANSITION INFORMATION EXCHANGE (TIE) SUMMARY REPORT

Issue No.	Issue Synopsis	Reporting Org.	Respons. Org.	Suspense Date	Status
1	DCCR Test and Evaluation Master Plan (TEMP) needs to be approved.	ACT-205	ACT-205	Prior DRR.	TEMP was submitted to the TPRC for approval at the
2	Implementation workload estimates for receiving sites need to be refined.	AUA-230	AUA-230	Prior to equip. del. to second site.	Implementation workload estimates are in work.
3	A waiver of the powering-up procedure required for equipment placed on the critical power bus, as specified in FAA Order 6950.15B, must be approved by ANS.	AUA-230	AUA-230 / ANS-220 / ANS-500	Prior to equip. del. to first site .	AUA-230 has requested a waiver from ANS-220 and recommended an alternate procedure.
4	A waiver of the six foot restriction on length of flexible conduit for power cables established in FAA Specification FAA-C-1217 must be approved by ANS-220.	AUA-230	AUA-230 / ANS-220	Prior to fit-up at first site .	ANS-220 granted a waiver of the restriction.
5	A DCCR Disposal Plan must be developed and approved.	AUA-230	ALM-500	Prior to first site ORD .	ALM-500 is in work on a Disposal Plan.
6	A waiver to FAA Order 6650.9 is required to allow data cables beneath raised floors to be bundled vice placed in cable trays.	AUA-230	AUA-230/ ANS 220	Prior to fit-up.	ANS-220 granted waiver 2/14/96.

APPENDIX C - ACRONYMS

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AAS, Advanced Automation System 34
AC, Alternating Current 27
APMNI, Associate Program Manager for NAS Implementation 4
ARTCC, Air Route Traffic Control Center 1
AT, Air Traffic 9
ATC, Air Traffic Control 5
ATS, Air Traffic Service 47
ATSTT, Air Traffic Services Test Team 42
CAI, Contractor Acceptance Inspection 2
CAS, Commercially Available Software 5
CCB, Configuration Control Board 68
CCCH, Central Computer Complex HOST 5
CCD, Configuration Control Document 76
CDC, Computer Display Channel 1
CDLS, Contractor Depot Logistics Support 57
CHI, Computer Human Interface 59
CM, Configuration Management 43
CMIP, Configuration Management Implementation Plan 67
CMLS, Contractor Maintenance and Logistics Support 9
CMO, Configuration Management Officer 67
CNS, Communications, Navigation and Surveillance 1
CO, Computer Operator 13
COI, Critical Operational Issue 41
COTS, Commercial-Off-The-Shelf 5
CPC, Critical Power Center 77
CPP, Critical Performance Parameter 41
DC&S, Display Controller and Switch 12
DC, Display Controller 6
DCC, Display Channel Complex 1
DCCR, Display Channel Complex Rehost i
DCP, Display Channel Processor 7
DCRP, Display Channel Replacement Processor 6
DG, Display Generator 6
DP, Distribution Panel 77
DRR, Deployment Readiness Review 8
DSR, Display System Replacement 5
DT&E, Developmental Test and Evaluation 41
DTWG, DCCR Test Working Group 47
DVT, Design Verification Test 45
EDARC, Enhanced Direst Access Radar Channel 7
EMI, Electromagnetic Interference 24
ER, Engineering Requirement 47
ESD, Electrostatic Discharge 57
ETWG, En Route Integrated Product Team Test Working Group 47

F&E, Facilities and Equipment 13
FAA, Federal Aviation Administration i
FAALC, FAA Logistics Center 57
FAATC, FAA Technical Center 1
FAT, Factory Acceptance Test 41
FBCN, Financial Baseline Change Notice 33
FCA, Functional Configuration Audit 68
FMF, Facilities Master File 74
GFP, Government Furnished Property 45
GSIP, Generic Site Implementation Plan i
HCS, Host Computer System 7
Hz, Hertz 27
I&I, Installation and Integration 44
I/O, Input/Output 7
IGCE, Independent Government Cost Estimate 33
ILSP, Integrated Logistics Support Plan 4
INCO, Installation and Checkout 2
IOC, Initial Operational Capability 2
IOCE, Input/Output Control Element 7
IOT&E, Independent OT&E 41
IOTRD, Independent Operational Readiness Declaration 42
IPG, Implementation Process Guidelines 4
IPL, Initial Program Load 11
IPT, Integrated Product Team 8
JAI, Joint Acceptance Inspection 3
KDP, Key Decision Point 8
LAN, Local Area Network 21
LRU, Line Replaceable Unit 39
MAU, Multi-Station Access Unit 21
MDFM, Master Delivery Forecast Module 61
MIPS, Million Instructions Per Second 7
MNS, Mission Needs Statement 3
MOP, Minimum Operational Performance 41
MTBF, Mean Time Between Failure 12
MVS, Multiple Virtual Storage 51
NAPRS, National Airspace Performance Reporting System 74
NAS, National Airspace System 2
NOM, NAS Operations Manager 6
OCD, Operational Capability Demonstration 41
OJT, On-the-Job Training 3
ORD, Operational Readiness Demonstration 2
ORDoc, Operational Requirements Document 3
OSHA, Occupational Safety and Health Administration 35
OT&E, Operational Test and Evaluation 39
PA, Project Authorization 13
PAT&E, Production Acceptance Test and Evaluation 41
PC, Personal Computer 21

PCA, Physical Configuration Audit 68
PIP, Program Implementation Plan i
PMCS, Primary Mode Control Selector 7
PTL, Product Team Lead 67
PTR, Program Trouble Report 43
PVD, Plan View Display 5
RAPM, Regional Associate Program Manager 1
RE, Regional Engineer 70
RIM, **R**-Console Interface Module 7
RIOT, Replacement Input/Output Terminal 6
RKM, Radar Keyboard Multiplexer 6
SAT, Site Acceptance Test 46
SE, Systems Engineer 11
SI&I, System Integration & Implementation 26
SIP, Site Implementation Plan 1
SMMC, System Maintenance Monitor Console 24
SMO, System Management Office 37
SOW, Statement of Work 4
SPEC, Specification 4
SUM, Software User's Manual 59
TCU, Tape Control Unit 22
TEMP, Test and Evaluation Master Plan 9
TIE, Transition Information Exchange i
TIM, Technical Interchange Meeting 67
TOR, Technical On-site Representative 70
TP, Transition Plan 4
TPRC, Test Policy Review Committee 9
VM, Virtual Memory 51

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